THE SUNBEAM SURVIVOR

Service and Maintenance Help
for the
Sunbeam Alpine and Tiger Owner

TIGERS EAST/ALPINES EAST TECH TIP MANUAL

Acknowledgments

The Editorial Staff graciously acknowledges the many contributors to the Sunbeam Survivor, both to those whom we were able to properly credit and those who remain anonymous. Thanks to all who have taken the time to share their experiences with their fellow TE/AE members over the years.

TE/AE is also indebted to Tom Calvert and "Tiger Tom" Ehrhart, who nurtured the initial idea for this manual and then, with the assistance of Barry Schonberger and Kelly Weinzapfel's Herculean data entry efforts, have fulfilled this long-held objective.

Credit for the binders and indexing system belongs to Larry Wright. We have used this three-ring, one-side print format in order to help this manual become a living reference document as well as to facilitate its use in the garage or workshop.

Finally, a debt of gratitude to our 'significant others' and family members - including those on the Editorial Staff - for their support and understanding during the countless hours involved in creating the product you're now reading.

Address:
Tigers East/Alpines East
P.O. Box 1260
Kulpsville, PA 19443
Phone/Fax: 717-566-6813

Introduction

Welcome to TE/AE's first full compilation of Tech Tips!

This collection is the result of the delightfully frustrating process of restoration and "improvement" of Sunbeams as recorded by those members of TE/AE who have been there.

Those of use who authored this information, and those of us who assembled this volume, hope that you will benefit from the extensive knowledge contained herein. When undertaking any repair, it is comforting to be able to rely on information from those who have gone before.

A few caveats from the editors:

1. Several articles cite prices and suppliers. Please call or write to ascertain availability and current price information before you order.

2. There are many methods of repair, restoration, and modification of Sunbeams. There are several areas of controversy, on which we have presented as many approaches as possible. We recommend that you speak prior to attempting repairs.

3. Read the articles through, prior to beginning the repair. Some information found at the end of articles can save frustration in the middle of the repair.

We are blessed in TE/AE with a wealth of knowledge held by considerate and sharing members. Take advantage of this tremendous asset. The club is built on the efforts of all. We encourage you to become another of the "experts" on whom we all rely.

We intend this to be a First, not Final, Edition. In order to do so, we need your input. Please send us your ideas, or better still, your new Tech Tips.

Happy Rooting!

The Editorial Staff

Tom Calvert	Tom Ehrhart	Bill Dewell
Bob Sharkey	Stephen Hansen	Jim Anderson
Judy Sharkey	Linda Hansen	Robin Quinter

INDEX TO SECTIONS

TIGERS EAST/ALPINES EAST TECH TIP MANUAL

Section E - Clutch & Propeller Shaft

Section F - Gearbox & Overdrive

Section G - Suspension

Section H - Rear Axle

Section K - Brakes

Section L - Wheels & Tyres

Section M - Electrical System

Section N - Body

Section P - Heater

Section S - Parts Interchange

Section T - Miscellaneous

Note no entries for:

Section J - Steering
Section O - Recommended Lubricants
Section R - Special Tools

June '92

General Data

General Dimensions

Wheelbase	7 ft. 2 in.	(218•4 cm.)
Track - Front	4 ft. 3 3/4 in.	(131•4 cm.)
Rear	4 ft. 0 1/2 in.	(123•2 cm.)
Overall - Length	13 ft. 0 in.	(396•2 cm.)
Height	4 ft. 3 1/2 in.	(130•8 cm.)
Width	5 ft. 0 1/2 in.	(153•7 cm.)
Ground Clearance	4 1/4 in.	(10•8 cm.)
Turning Circle	37 ft. 6 in.	(11•4 cm.)
Kerb weight (approx.) - '260'	2565 lbs.	(1163 kg.)
'289'	2574 lbs.	(1168 kg.)

Capacities

Engines - '260' (including filter)	8 1/2 pints (10 U.S. pints; 4•83 litres)
'289' (including filter & cooler	9 1/2 pints (11•4 U.S. pints; 5•4 litres)
Gearbox (transmission)	3 1/4 pints (4 U.S. pints; 1•8 litres)
Rear axle	2 1/2 pints (3 U.S. pints; 1•4 litres)
Steering unit	1/2 pint (6 U.S. pints; 28 litres)
Cooling system (with heater)	27 pints (32•4 U.S. pints; 15•3 litres)
Fuel tank	11 1/4 gallons (13•5 U.S. gallons; 51 litres)

Engine	'260'	'289'
No. of cylinders	8 (90° 'V')	As '260'
Cylinder numbering (front to rear):		As '260'
Right bank	1, 2, 3, 4.	As '260'
Left bank	5, 6, 7, 8.	As '260'
Bore	3•8003/3•8027 in. (96•52/96•58 mm.)	4.000/4.0002 in. (10•60/101•66 mm.)
Stroke	2•87 in. (73 mm.)	As '260'
Capacity	260 cu. in. (4261 cc)	289 cu. in. (4737 cc.)
Compression Ratio	8•8:1	9•3:1
Pressure	130/170 lb. in.^{2} (9•1/11•9 kg. cm^2)	As '260'

Performance

B.H.P. gross	164 Developed @ 4,400 RPM	200 @ 4,400 rpm
B.H.P. net	136 Developed @ 4,200 rpm	174 @ 4,00 rpm
Max torque	258 (35.7) @ 2,200 rpm	282 (38•9) @ 2,400 rpm
Net torque lb/ft (kg m)	226 (31.2) @ 2,400 rpm	253 (34•9) @ 2,400 rpm
Max BMEP lb/in^2 (kg/cm^2)	149 (10•4) @ 2,200 rpm	147 (10•3) @ 2,400 rpm
Net BMEP lb/in^2 (kg/cm^2)	131 (9•2) @ 2,400 rpm	132 (9•3) @ 2,400 rpm

Road Speed/Engin Speed

Road Speed @ 1,000 engine rpm

Gear	'260' (HEH-E)	'289' (HEH-B)
Top	23•92 mph (38•5 kph)	23•92 mph (38•5 kph)
Third	18•56 mph (29•8 kph)	17•36 mph (27•9 kph)
Second	14•17 mph (22•8 kph)	12•41 mph (19•9 kph)
First	10•31 mph (16•5 kph)	8•61 mph (13•8 kph)
Reverse	10•31 mph (16•5 kph)	8•61 mph (13•8 kph)

Cylinder Block	'260'	'289'
Material	Cast Iron	As '260'
Max. oversize (bore)	.060 (1•52 mm.)	•40 in. (1•01 mm.)
Dia. main bearing bore	2•4412/2•4420 in. (61•00/62•02 mm.)	As '260'

Cylinder Head (for torque loading figures, see table at end of section)

Material	Cast Iron	As '260'
Combustion chamber vol.	53/56 cc	52/55 cc
Angle of valve seats	45°	As '260'
Valve guides	Integral with head	
Gaskets - type	Steel Asbestos	

Valves

Position & Operation	Overhead, push rods and rockers	
Valve clearance	•82/•152 in. (2•08/3•86 mm.) (Clearance is at the valve stem tip with the hydraulic valve lifter collapsed - see section B).	
Valve lifter lead down rt.	10/100 sec.	5/50 sec. (measured @ 1/16" in plunger travel)
Timing - Inlet opens	21° B.T.D.C.	16° B.T.D.C.
Inlet closes	51° A.B.D.C.	70° A.B.D.C.
Exhaust opens	57° B.B.D.C.	52° B.B.D.C.
Exhaust closes	15° A.T.D.C	24° A.T.D.C.
Head diameter - inlet	1•662/1•677 in. (42•21•59 mm.)	As '260'
Exhaust	1•381/1•396 in. (35•07/35•45 mm.)	1•442/1•457 in. (36•63/37•01 mm.)
Stem diameter - inlet	•6416/•3423 in. (8•67/8•69 mm.)	As '260'
Exhaust	•3406/•3413 in. (8•65/8•66 mm.)	
Oversizes - inlet & exhaust (used when valve guides are reamed out)	+•003 in. (•07 mm.) + •015 in. (•38 mm.) and +•030 (.76 mm.)	
Angle of valve faces	44°	
Stem clearance in guide-inlet	•0010/•0027 in. (•02/•60 mm.)	
Exhaust	•0020/•0037 in. (•05/•09 mm.)	
Valve length	4•860 in. (12•34 cm.)	
Valve seat width	0•060/0•080 in. (•5/2•0 mm.)	
Valve spring - type	Single	
Retention	Cup and split cotters	
Free length	2•15 in. (54•6 mm.)	2•09 in. (53•08 mm.)
Fitted length	1•75/1•78 in. (44•4/45•2 mm.)	1•75/1•70 in. (44•4/45•2)
Load fitted	57/63 lb. (25•8/28•5 kg.)	71/79 lb. (32•2/35•8 kg.)

Timing Chain

Pitch	•375 in. (9•5 mm.) x 58 links	As '260'
Width	•75 in. (19 mm.) nominal	
Lubrication	Splash	

Camshaft

Position	Central in block (above crankshaft)	As '260'
No. & type of bearings	5, steel shell white metal lined	
Journal diameter - No. 1	2•0825/2•0835 in. (52•89/52•92 mm.)	

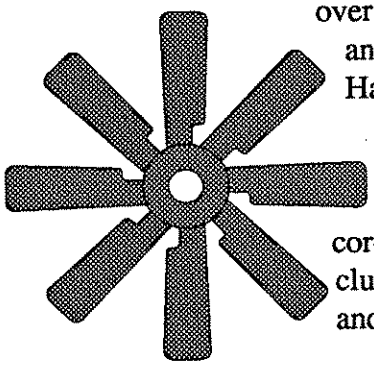
Heating Solution No. 999

The original Heating Solution No. 999 published in 1980, and No. 999 revisited in 1981, 1983 and 1984, have assisted dozens of Tiger owners in the U.S. and Canada resolve their overheating problems. Here is the latest information on what some call the "INDIANA CORE."

Increased cooling with the "INDIANA CORE" is provided by the use of small scoops or louvers cut into the fins between each radiator tube. These louvers force the air to circulate inside the radiator a longer period of time, allowing it to remain in contact with the fins longer and exchanging more heat. This louvered design is now used by all radiator manufacturers in custom cores. One of the concepts in core design is the use of staggered tubes. Instead of having three, four, or five tubes running across the radiator one in back of the other, they staggered the tubes front to back each slightly below the one in front. This allows for more tubes per inch of depth and, in turn, more water volume and flow.

The cores mentioned in this article are manufactured by Mangum and are available throughout the U. S. The Mangum core uses 1/2" tubes on 5/8" centers. Your stock Tiger core is 18 5/8" high, 15 1/2" wide, and 1 3/4" deep. The replacement R series core in the stock dimensions is a three tube design with 11 continuous fins per inch. The tank plates are 2 1/8". Experience has shown that the replacement of your stock core with the stock dimension Indiana Core could give you 5-10 degrees improvement. For those who need additional cooling, the next available step is to a 2 3/8" core. This core has four tubes for an even greater capacity and additional flow. The tank plates are 2 1/2". This radiator should handle the majority of street Tigers short of all-out extreme racing conditions. Installation of this core should not require modification to the radiator bulkhead. The brackets on the radiator are set 3/8" to the rear from the stock location to allow for the radiator to fit deeper into the bulkhead. This fitting allows for fan to radiator and radiator to rack and pinion clearance.

A RADAC core is now available from North Side Radiators. This core is 2 1/8" deep with 4, 1/2" tubes on 1/2" centers. It provides the same amount of flow as the 2 3/8" Mangum core but in a shallower package, for those of you who want a very stock appearance. The cost is a considerable increase over the Mangum, but if originality is a concern, it is an alternative. This radiator was installed in the Harrington-bodied Sunbeam Tiger with excellent results.



The custom radiator people at North Side Radiator are familiar with the Tiger radiator and the cores available. When shipping your radiator, include your name, address, phone, and the core size, and 11 louvered continuous fins per inch. Turn-

around time has been running about two weeks. The price is still reasonable, and the service quality. One of the biggest advantages of this modification is that it is a turn key setup. The radiator comes to you ready to install.

Don't hesitate to call me with questions or problems.

Barry Schonberger
(812) 985-9592

Summary of Tiger Overheating Cures

by Dick Guthoehrlein

Tiger overheating is a problem familiar to many of us. The following article summarizes some techniques which should help cure most overheating problems.

Before discussing the cures, a quick review of the theory is in order. Starting at the front of the car, the primary objective is to get as much cool air flow through the radiator as possible. The air must be kept in contact with the radiator long enough to accomplish maximum heat transfer. The objective is to transfer the engine heat to the air via the coolant and radiator. The air must then be removed from the area behind the radiator to make room for cooler incoming air. It is also vital that the correct circulation of the coolant through the block and heads be maintained. Here again the cooling medium must remain in contact with the cast iron long enough to accomplish the heat transfer.

Now the cures. First, the airflow into the radiator must be maximized. One simple thing that can be done is to block off the holes behind the horns. This will tend to force more air to flow through the radiator. If originality is not a concern, you can remove the grill bars and emblem. Portions of the splash pan and front apron can also be removed. In extreme cases, the bumper could also be removed. All this cutting and removing can accomplish increased air flow and a cleaner, less turbulent air flow but you will lose some structural rigidity. As such, try the least obtrusive method first.

Now that we have all the air we need, how do we get the radiator to transfer its heat to the air? The first thing to do is to remove any paint from the radiator, especially the fins and tubes. Any paint or foreign matter on the radiator will slow down the heat transfer. The next stage of improvement is to obtain a new radiator with a thicker coil and/or improved design fins. The ultimate would be to recore the radiator with a thicker core and baffle fins. These fins are "S" shaped and provide more surface area for transferring heat to the air.

Next, what do you do with the air after it has picked up the heat from the radiator? In stock form, the air is forced down and around the motor and into the area under the car. A first step is probably to install a fiberglass LAT option hood. This directs fresh air to the carb and provides air vents into the area in front of the windshield. A more radical modification is to cut triangular openings in the sheetmetal in front of and behind the wheel wells, in the vicinity of the windshield washer bottle and the brake servo unit. On a street car, louvers or screen can be used to cover the openings. These holes will vent into the wheel wells where the air is rather turbulent. This modification may not

accomplish a great deal. The rearward holes can be vented through the fenders to the outside of the car. A simple triangular box structure can be fabricated for this purpose. Probably the most radical change but also the most beneficial would be the installation of a front spoiler or air dam. At speed, this device will develop a low pressure area under the car. There is an added benefit here. In traffic, where most overheating problems occur, a spoiler or air dam will tend to stop the recirculation of hot air through the radiator. The last modification in this area concerns the fan shroud. Ideally, the front edge of the fan should be even with the rear edge of the shroud. The Tiger has the fan recessed into the shroud. As the fan pulls the air through the radiator, some of the air is thrown off radially by centrifugal force. This air then circulates in the area between the fan and the radiator virtually cutting off circulation through the corners of the radiator. The cure, is to use your tin shears and cut off some of the shroud. Or, if you are a real wizard with sheet metal, you may be able to fabricate a new shroud. If you are that good, you can fill in the bottom of the shroud that is missing from the stock unit.

Another area of consideration is the water pump. There has been much discussion about the use of cast iron versus aluminum pumps, but there is no agreement as to which is best. If your engine is stock and the pump is in good condition, (the impellers aren't rotted away) either pump should work. If the engine is modified and/or you have a rear end gear ratio requiring high engine revs, the pump may be cavitating, and/or pumping the water through the block too fast. The cure for both problems is to remove every other vane from the impeller.

Pumping water too fast may seem to be a contradiction when you are talking about overheating problems. What happens is that the water is not in the radiator or engine block long enough to transfer heat efficiently. Also, the coolant flow through the engine block can be disturbed. This will cause local hot spots to develop. The same problems can occur in a stock engine if you remove the thermostat. Replace it with a gutted thermostat or a flat plate with holes drilled in it. How many and how big? Cut and try.

Rust and sludge in the block can also cause problems. If the coolant does not come into contact with the cast iron, very little heat transfer will occur. This problem can be prevented by using anti-corrosion additives and by frequent flushing of the cooling system. Use a strong caustic soda solution or any of the commercial products for flushing the system. You can remove the block and have it cooked out, if necessary.

Another area with considerable deviation of opinions is what coolant to use. Opinions range from a 50/50 solution to 100% antifreeze. The consensus is that each car is different and that curing the problem is mostly a cut and try proposition. Things that have worked for one person seemed to have absolutely no affect for another.

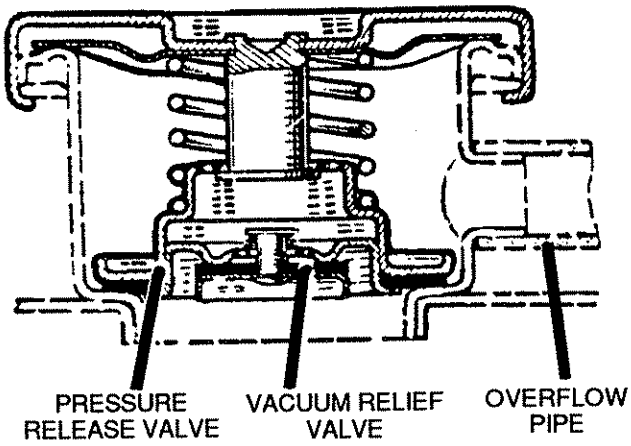
If you use all of these tips on your car, you should be able to sit in the middle of Death Valley and idle all day long — well, almost all day!

Stop That Burping Tiger!

Stock Tigers often have a habit of burping out coolant after a hot run. In addition to being unsightly, this habit can be expensive due to the high cost of anti-freeze. Help your Tiger kick this habit by installing a coolant recovery system. This system is cheap (usually less than $5.00 at most stores) and will really help your Tiger keep its radiator full.

The stock Tiger came equipped with a pressurized cooling system operating at approximately 14 PSIG. The effect of pressurization is to raise the boiling point of the coolant. For example, at sea level, a 100% water coolant boils at 248 degrees F and a 50% water-50% Prestone coolant boils at 265 degrees F. The cooling system efficiency is increased due to improvements in coolant circulation (reduced vapor lock in water pump) and the extended operating temperature range of the coolant. This stuff is not new; most cars (even British cars!) have used some type of pressurized cooling system.

The spring-loaded radiator cap is designed to make a seal at both the top seat and a lower inside seat in the filler neck as shown in the sketch. An overflow tube connects to a point between these two seats. The stock Tiger radiator cap is equipped with a heavy, specially-calibrated spring which controls a pressure relief valve to seal off the cooling system from the overflow tube, thereby permitting the system to pressurize itself automatically as the coolant expands as it is heated. When excess pressure builds up, the spring resistance is overcome and the pressure relief valve opens. The pressure is relieved by the coolant and the steam escaping from the radiator through the overflow tube and onto the pavement.



Tigers like to burp immediately after being shut off because the residual engine heat causes localized boiling within the engine block. The radiator cap also has a vacuum relief valve which opens automatically as the engine is cooling to prevent the formation of a vacuum in the system.

The coolant recovery system is an extremely simple set-up consisting of a reservoir bottle which collects the "burps" from the overflow tube. Since the recovery system is designed to be air-tight (special radiator cap is provided with the kit), the vacuum relief valve pulls coolant back into the radiator when the engine is cooling. The reservoir bottle is equipped with its own overflow in case the radiator overflow should exceed the reservoir capacity. Since the coolant is transferred between the radiator and reservoir, your Tiger will always have a radiator tank full of coolant.

Another advantage of the recovery system is its de-aerating capability. The stock Tiger allows air to enter the cooling system through the overflow tube. Aerated cooling water promotes corrosion as well as vapor locking. The recovery system eliminates these problems because air is excluded from the system.

Installation of a coolant recovery system on the Tiger is simple, provided

remote oil filter system have room where the stock oil filter used to be located. A neat set-up can be made with a Tiger windshield washer bottle and a mounting bottle cap which fits the Tiger bottle. The kit contains hoses, 12-14 PSI special vacuum tight radiator cap, reservoir bottle cap and plastic reservoir (not used in installation). It's a very popular kit in California and is usually available at auto parts discount stores.

Water Pump Dimensions - Tiger

The water pump assembly dimensions listed in the Tiger factory shop manual are not correct. The 260 aluminum pump is listed as 5.15", but is actually 4.875". The 289 cast iron pump is listed as 5.43", but is actually 5.100".

The dimension is measured from the front of the fan pulley hub to the gasket surface. The rear cover plate and gasket must be removed from the cast iron pump.

When replacing the water pump, be sure to use a hub that fits the water pump pulley and fan you are using. The stock pulley and fan use a hub with a one inch pilot. If not available, take a stock Ford hub and have it machined, then reinstall on a new pump with the correct assembly dimension.

Be sure to follow the precautions outlined in the shop manual when installing the new hub as it is easy to destroy the seal and bearing of the new pump.

If you want to use a cast pump instead of aluminum, or vice-versa, use the appropriate timing cover for the pump you are using. Either will fit all 260-289-302 motors.

The Indiana Core Installation Results

by Jim Morrison 3/23/91

This report is on the installation of the Mangum radiator core available from Northside Radiators, 1313 N, Heidelbach Avenue, Evansville, IN 47711, (812-423-7177). This core has been much publicized in previous TE/AE newsletters and CAT shop notes. It was highly recommended by those who tried it with reported reductions in water temperature of 10 deg to 30 deg. But first, let me bring you up to date on what led me to make this purchase. When I bought my Tiger five years ago, it had a 289 with high lift cam, headers, Torker intake mainfold, 10:1 compression ratio, Mallory dual point, etc. and the original, stock radiator. I immediately had overheating problems, so on went a seven blade flex fan, new 160 deg thermostat, new coolant, new radiator cap, but no change. I then pulled the radiator and took it to a local radiator shop to be flow tested. The flow test showed blockage in the tubes. As a brand new Tiger owner, I was not aware of the extremes one sometimes must go through to keep a Tiger cool and thought the problem could be fixed by simply "rodding out" the original core. The radiator shop could not rod out the old core due to the severity of the blockage and recommended a new core. I had a new core installed that was slightly thicker than the stock radiator, but the overheating problem continued. In desperation, I removed the heads to find some badly blown head gaskets. Replacing them fixed things up to make the car drivable.

It has never run as cool as I would like, but what Tiger does? After moving to Hunstville, AL. I had a small leak in the radiator. While getting it fixed, the radiator man informed me that my replacement core "was about the lowest quality core on the market". I have always wondered what a quality core would do for the operating temperature. This brings things up to a few weeks ago. The car was running about 195 deg to 200 deg on the highway on hot days. While not too bad, the temperature would creep up fast at stop lights or just around town. The thought of having a poor quality core being part of my problem, combined with all the good results I heard about the Mangum core, prompted me to make the plunge and ship the radiator to Evansville. I selected the two and three eights inch thick core and asked that they not paint the radiator so that I could paint it as I desired. I received the re-cored radiator back in about ten days. Shipped COD at a total cost of about $240. The workmanship looked good and it was unpainted as I had asked. Now on to the installation. The brackets on the new radiator are mounted in such a way so as to put the extra core thickness forward of the plane of the brackets (in this way, the fan-to-radiator clearance remains the same as with the stock core thickness and no modifications to the fan shroud are necessary). This necessitates the removal of some of the bulkhead sheetmetal to make room for the core to protrude forward. This was easily done with a metal blade in a jig saw. The big test was driving it on a hot day. Much to my disappointment, the car ran no cooler than before. My conclusion from this is that the radiator efficiency may not be the limiting factor in the operating temperature of my car and/or the "low quality core" does all that the quality core can do. My oil cooler sits directly in front of the radiator and I wondered if it might be blocking too much air from getting to the radiator, so I removed the oil cooler. This actually lowered the water temperature by about five degrees! Well, my radiator saga is over. I am a poorer, but wiser Tiger owner who knows that he has done all reasonable things (short of sheetmetal mods) to get the beast to run cool and maybe some of you can benefit from my experience. (ed note: A non-flex 6 or 7 blade high pitch fan blade would have complemented Jim's radiator and may have resolved the overheating problem)

Tiger Engine Cooling Revisited

by Dan Cameron

There have been many articles written on the subject of how to get the Tiger to run cooler, but in spite of all the little tricks, some of us continue to flirt with the other side of the 200 degree mark. This is particularly true for those who have modified engines which directly adds to the under hood temperatures. The key is to maximize the heat transfer out of the radiator. Larger and/or more efficient radiator cores and louvered hoods to increase the airflow through the radiator are a start, but on those 90 degree plus days, while idling in a line of traffic, the old needle creeps up. I personally experienced this problem when a new engine was installed in my MkI. All those mega-bucks spent on engine performance converted themselves directly to horsepower and heat. Even with a six blade, high pitch fan (no louvers) the problem persisted. A Rather simple and inexpensive solution was to install an auxiliary fan in front of the radiator. The additional air flow greatly improved the capacity for heat transfer. After evaluating the world marketplace, I found there are about as many fan manufacturers as there are Tigers. For our applications, the flat pan motor design is best due to its thin front-to-rear thickness (about 2.5")

minimizing clearance problems. Now a word of caution: some of the units have fan blades that are not as rigid as others and have a tendency to flex. This happened to one of our friends from CAT on his way to the United at Indy. At highway speeds, the blades were pushed back into the radiator core carving out a perfect circle of leaks! The fan I chose is manufactured by Derale Oil Coolers, Fountain Valley, CA.; model number 902. It is 12" in diameter, thermostatically controlled, compact and rigid. In addition there is a manual over-ride switch so that the fan can be turned on for full time operation when desired. The installation instructions are pretty good except that the wiring diagram provided with my unit was wrong resulting in a number of blown fuses before the problem was isolated. The wiring diagram on the box shows a cartoon of the wiring and the two-position switch. The problem was that the switch was upside down in the drawing resulting in the power line going directly to ground and zapping the fuses. Here are some installation tips:-Detach the fan blade from the motor and reverse it. Remember that we are mounting the fan on the front side of the radiator and pushing air through it. Most fans are shipped with the blade installed so as to pull air through using a mounting behind the radiator.-Be sure to place the thermostatic sensing unit on the left hand (driver's side) radiator tank. This is the hottest side and will provide better operation.-Run the wire leads to the thermostatic sensing unit through the fire wall parallel those going to the left hand headlight and horn.-For an added touch, go to the local junkyard and strip a late model wreck of its corrugated plastic wire covers. This will keep the engine compartment neat and the wires safe from abrasion.

Tiger Cooling Fans

by Barry Schonberger

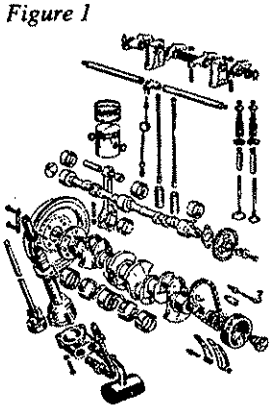
When building my first autocross Tiger, I took into consideration all of the current tricks to keep it running cool. I installed a 2-3/8" Indiana core, blocked off the horn ducts, built duct work from the lower apron to the radiator, ran a gutted thermostat, installed a six blade fan, adjusted the fan to shroud clearance, installed an electric pusher fan in front of the radiator, raised the rear of the hood and drilled 1-1/2" holes in the rear of the fender wells. Each of these modifications contributed to a Tiger that ran between 200 degrees and 210 degrees in hot conditions with a modified engine. However, at standstill idle, the car would climb into the 220 degree range. The holes in the fender wells were supposedly there to help exit the hot air from the engine compartment, but at speed the turbulence is too great in the fender for the air to exit, and at a stop there is nothing to move it. When I first built the car, I looked for a small 12 volt whisper fanlike those used in electronic equipment to install behind the fenderwell opening. All I could find was 110 AC fans at the time. Now that I have sold the car, what do I find at my local electronic store but 12 volt whisper fans. They come in an assortment of sizes with CFM rating from 25 to 106. Not much air movement, but maybe just enough. Wired in with the electric fan, they could be turned on in traffic to clear the engine compartment of that heat buildup. They are manufactured by ICO Rally and cost around $25.

Adapting an Oil Seal to the Timing Chain Cover of the Sunbeam Alpine Engine

by Russ O' Brien

Purpose: To stop oil leakage at the forward end of the crankshaft and improve lubrication of the timing chain.

Figure 1



Background: The evolution of oil seals has progressed from no seals at all to modern elastomeric lip seals which stop oil leakage for very long service periods. In between these extremes, attempts have been made using leather, rope, cork, felt, canvas, string, rags, etc. Most set-ups had a short useful lifetime or had a mechanism of springs or threaded nuts which required periodic tightening. The most effective leak-stoppers were cumbersome and extracted considerable power due to friction drag. The labyrinth and disc slinger system, used in the Alpine, does a partial seal job. With its reverse thread and no parts wearing, it does not change with time, but it steadily leaks.

The four cylinder Sunbeam Alpine engine was designed with a labyrinth seal (Rootes PT # 1228028, Damper Ring) and a slinger disc (Fig. 1) at the forward end of the crankshaft to minimize oil leakage. Since a labyrinth seal is not a leakproof seal, a minimum of oil is pumped to the adjacent timing chain to keep leakage to a tolerable level. Consequently, the drive sprocket wears and the timing chain "stretches" via wear at every link and pin, resulting in retarded valve timing, jumpy valve and ignition timing, and chain slap after the chain has lengthened beyond the range of the tensioner.

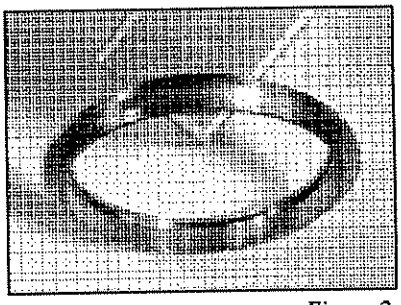


Figure 2

Replaceable oil seals have been supplied by numerous manufacturers for many years. Seals last about 60,000 to 80,000 miles before they leak. The oil seal maintains a light squeeze on the rotating shaft, similar to the squeeze of a stretch watch band on a wrist. Since these oil seals do such a thoroughly good job on other engines, there was a natural urge to adapt one to a Sunbeam and enjoy the benefits.

Adapter, Oil Seal to Timing Chain Cover

A means of mounting an oil seal was needed so that it would be centered on the shaft. After locating the smallest OD oil seal (C/R #17231) which would fit over a 1-3/4" diameter shaft, an adapter was designed for the seal to be pressed into and mounted in the timing chain cover. The adapter was made compact to clear the nearby pedestal bolt inside the timing chain cover. A flange was provided to facilitate high temperature soldering and maintain alignment with the cover (Fig. 2 & Fig. 2A).

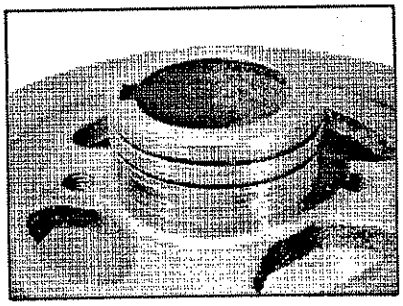


Figure 3

Harmonic Balancer Modification

The seal maintains contact with the rotating harmonic balancer. As supplied, this surface has a reverse thread labyrinth seal (Fig. 3). The surface is very rough and must be changed to a smooth finish to function with a synthetic rubber lip seal. Welded or brazed fill metal was considered but was discounted. To machine away the reverse thread to a smooth surface would have left the wall too thin at the keyway. It was decided to machine the reverse thread zone down a little and

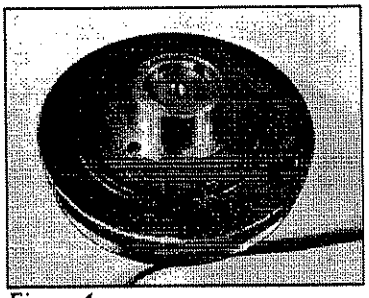


Figure 4

press on a steel ring with a 0.002" interference fit (Fig. 4). This tight fit eliminated the need for brazing the parts together. The harmonic balancer was then machined to a BE concentric with the bore.

Preparing the Timing Chain Cover

An alignment plug was made to facilitate lining up the cover with the spindle of a milling machine (Fig. 5). An adjustable fly cutter was used to bore a 2-3/8" diameter hole to fit the seal adapter (Fig. 6).

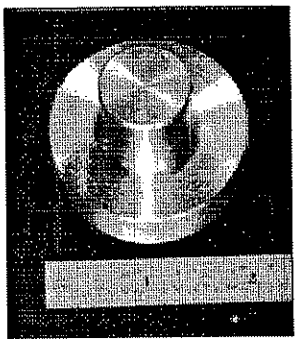


Figure 5

Soldering the Adapter to the Timing Chain Cover

Eutectic #157 high strength, silver bearing solder was used to solder the Adapter to the Cover (Fig. 7). The cover was sand blasted to remove paint before soldering. NOTE: Eutectic #157 solder is four times as strong as ordinary solder, has a melting point of 420 degrees F and stays bright and shiny.

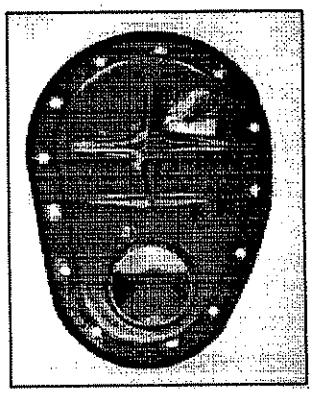
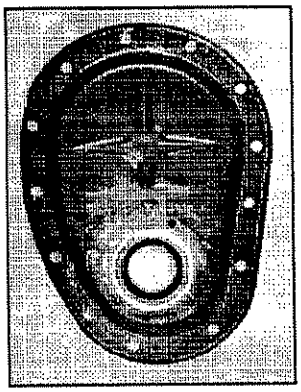


Figure 6

Oil Feed Line to Timing Chain, Capillary Tube

Figure 7



A capillary tube, 1/8" OD, is connected to the pressurized oil gallery and supplies oil to lubricate the timing chain. The capillary tube extends out over the timing chain drive sprocket, then makes a U-turn back to the sump. Adjacent to the sprocket, a tiny hole is drilled in the side of the capillary to lubricate the chain. The remainder of the oil is squirted back into the sump. With an oil seal in place and with no fear of leakage, all the oil coming through the capillary tube can be directed on the chain and sprocket to gain the maximum benefit of the seal. To do this, cut off the capillary tube as shown in Fig. 1 and point it toward the small drive sprocket. Advantages of this step are improved lubrication of the timing chain and sprocket, less wear and noise from contact with the chain tensioner, and improved oil cooling.

INSTALLATION TIPS

1. Per an obscure note in the Alpine shop manual, sealing compound should be applied to the left and right sides of the front main bearing cap to prevent oil leakage in troublesome cases (when machining tolerances combine to leave a big gap).
2. A ball and spring check valve is located inside the capillary tube fitting to prevent draining the oil gallery when the engine is off (Fig. 1). This also is in series with the timing chain lubrication system and must not be sludged.
3. After the Harmonic Balancer has been installed and before the tab washer and nut are installed, sealing compound should be applied around the crankshaft periphery and in the keyway to stop oil leakage.

CONCLUSION

This modification was a challenge which involved numerous process steps. However, it was easy once an oil seal was located in standard stock.

Alpine Low Oil Pressure Revisited

by Fred Mistr and Tom Ehrhart

The December 1981 newsletter (Vol. 6, No. 9) contained an article about that dreaded Alpine disease LOP, or low oil pressure. In that newsletter, Sunbeamites were coached on how to nurse your engine back to a healthy life. One area not covered in that Tech Tip was how to massage its heart (the oil pump) back to life.

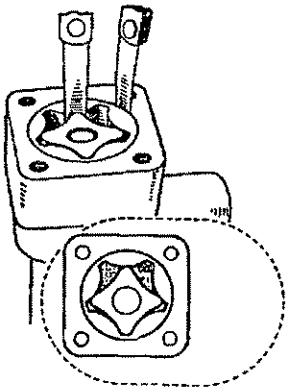


Figure 1

This Tech Tip is the next best thing to a pacemaker for your Alpine, and a whole lot cheaper, too! In fact, you will save so much money from this tip that you will be able to renew your Tiger East/Alpines East membership for about five years!

As mentioned in the December newsletter, there are basically three major causes of Alpine LOP: 1) Excessive rod, main and cam bearing clearance; 2) a defective oil pressure relief valve; and 3) the oil pump, the subject of this Tech Tip.

Now that the engine bearings and relief valve all have been renovated properly, let's get into the oil pump. The pump wears out in two areas: 1) the rotor tips and outer rotors, as shown in Figure 1, the rotor and housing, causing excessive end play (Figure 2).

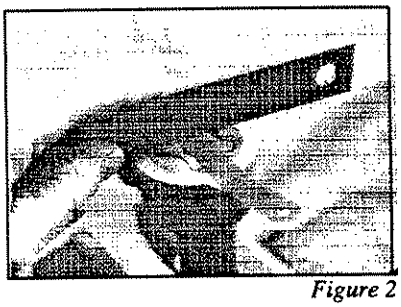


Figure 2

There are no remedies commonly available to the owner for worn rotors. However, we do have a way for everyone to eliminate rotor end play, which is the area needing the most attention. As the pump is used, the rotor will wear out the inside of the housing, allowing more than the acceptable amount of 0.001" to 0.003" end play (see Figure 2 for measurement). Since the excessive gap is really between the housing and rotor, it is a simple matter of removing material from the housing in order to bring the gap back into specification.

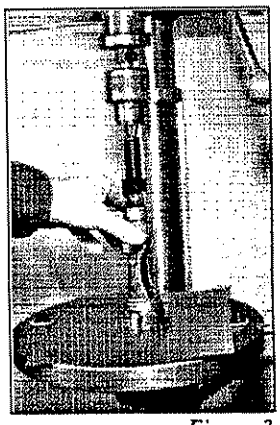


Figure 3

This process is accomplished by using a piece of #400 wet/dry sandpaper placed on a very flat surface! Place a thoroughly cleaned pump on top of the sandpaper and hold against the paper by firmly pressing down on the rotor shaft. A drill press works nicely for this operation (see Figure 3). However, with a little care, you may do it with only your hands.

With the pump held in position firmly by the rotor you will notice the housing turns very freely. This is the critical operation stage. While rotating the housing lightly against the paper, you will obviously be removing material. It's aluminum so it won't take much effort to remove the material. Check the gap frequently until you are down to 0.001" to 0.003". Shoot for 0.001", since that will obviously give better oil pump efficiency. The finished product should look like that shown in Figure 4.

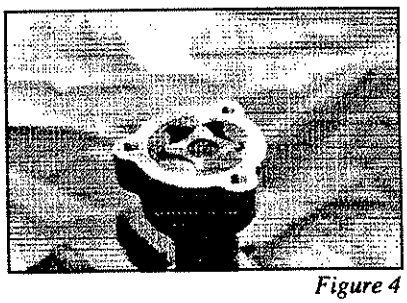


Figure 4

Remember to thoroughly remove all grit resulting from this procedure before re-installing! If you wouldn't eat off of it - it's not clean enough.

With the oil pump rotor end play held in check, you have greatly enhanced its efficiency. You now have a NEW Alpine engine.

Adapting an Alpine Oil Cooler to a Tiger

1. Remove the cooler and both lines from a LATE model Alpine (I used a '67 Series V).
2. Remove the oil filter and lines from your Tiger.
3. Mount the cooler in front of the radiator (there should be holes already in the sheet metal.) Mount cooler on top as shown or from bottom as in Alpines (Fig.1).

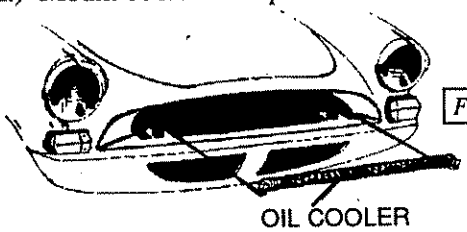


Figure 1

4. Position the lines about where they will run in the car. One line will run from the cooler to the filter top center hole; the other will run from the cooler to the oil filter take-off on the block.
5. Now take the line from your Tiger oil filter, the one that runs from the center bolt on the filter (Fig. 2).

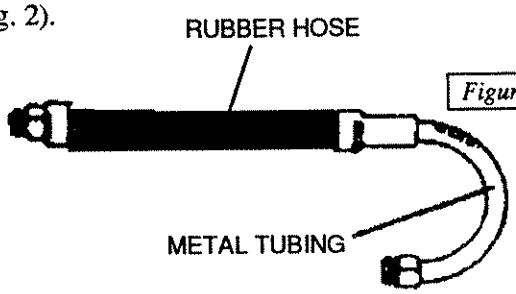


Figure 2

With a hack saw, cut the fittings from the rubber hose by cutting through the crimped areas!

6. The short piece goes into the block where you will fit one of the lines from the cooler. Cut the line to length.
7. The metal tubing may have to be bent a little to allow you to run the other cooler line to it. Cut the line to length.
8. You can either take your fittings and the cooler lines to a hydraulic shop and have the fittings crimped on or you can put a slight double flare on the metal tube and use hose clamps (which is what I did).

A schematic of what you will have is shown in figure 3.

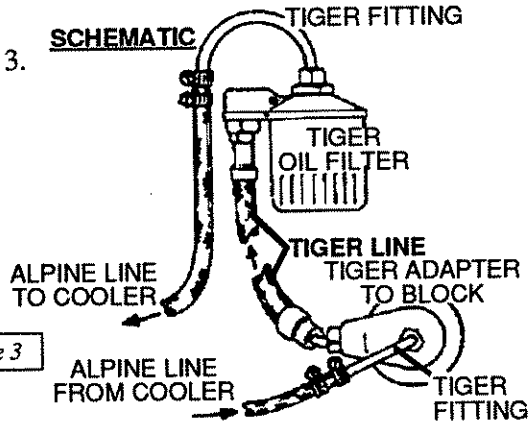


Figure 3

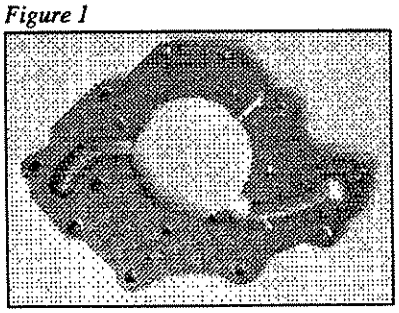
OIL FILTER LINES

Use 1/2 " ID air conditioner hose, available at your local auto parts store, to replace those leaky oil filter lines or to hook up your oil cooler. Use the fittings from your old hoses and some quality stainless steel hose clamps.

Makin' the Small Block Ford Even Smaller

submitted by Bob Yurasits
(Courtesy of Street Scene - The Member Only Publication of the National Street Rod Association and also Cherry Fords, etc.) by Joe Mayall

Figure 1



Ford lovers have, for years, been trying to find ways to make the small block (289/302) Ford engines fit into the confines of early vehicle engine compartments without butchering the firewall. The most obvious and often used approach has been to shorten the stock water pump, and while this does work, it leaves the car owner with he distinct disadvantage of not being able to buy an "over-the counter" replacement.

Jim Cherry is one of those Ford lovers who has found a way to beat the "system". Jim developed a special kit to shorten the Ford engine for his 33 Ford Phaeton 2-3/4 ", and now after a summer of trouble free running', and because of many requests, he is manufacturing and marketing the kit. The kit comes in two versions; one with the basics where the customer supplies the items available through normal automotive parts outlets, and the other one has everything needed, including gaskets.

Basically, what the kit does is provide a special aluminum adapter plate (Fig. 1) so that the stock, long-necked Ford water pump can be replaced with a shorter GM pump.

While this kit has been designed to be a bolt-on using stock items, there is a simple modification required to the GM water pump. This modification can be done by the automotive parts house if they are equipped with a press (like one used to press a bearing on a rear axle.) The fan/pulley flange on the water pump must be pressed further onto the shaft (to within 1/8" of the housing), and then the extra portion of the shaft can be trimmed off leaving a stub for fan and pulley alignment. This is not a difficult modification, and the first parts house we tried did it for us at "no-charge". Cutting the shaft can be done with a hacksaw, but unless the radiator is very close to the water pump shaft, this modification will not be necessary in many applications.

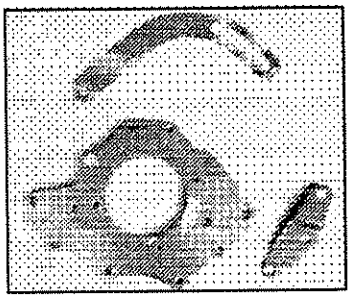


Figure 2

The basic kit (#CFP-1 Fig. 2) comes with the aluminum adapter, an alternator adjusting bracket (arm), and a special front alternator mounting bracket, The complete kit (#CFP-2 Fig. 3) includes the above plus the modified water pump, the water pump (top) pulley, the crank (lower) pulley, and the rear alternator mounting bracket. Both kits come with complete, illustrated installation instructions and a parts list with the Ford and/or GM part numbers.

Since shortening the water pump also means moving the alternator back, the aluminum spacer must be shortened to get proper belt alignment, and a shorter bolt will be needed. Depending on the front crossmember and the location of the engine, one or two of the crank (lower) pulley grooves may have to be trimmed off, and this

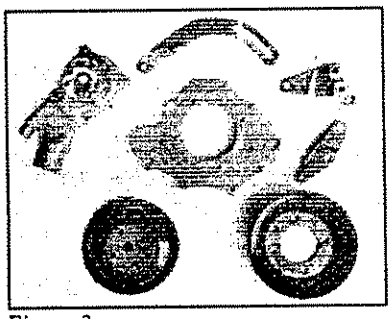


Figure 3

should be done on a lathe.

One of the drawbacks to using a shortened Ford water pump is that the modification is very involved, meaning that you would have to carry a spare. With this kit the water pump modification is simple enough that a replacement is readily available, and the modification can be done where and when it is purchased.

The basic kit is (#CFP-1) and the complete kit is (#CFP-2). Each is also available chrome plated or in gold irradiate at extra charge. For more information or to order, contact: Cherry Fords, Box 213 R.D. 1, Warwick Furnace Road, Glen Moore, PA 19343, 215/469-9118. (Ed note: Call for current price/availability info.)

Capri V-6/Sunbeam Alpine

author unknown

In September, 1964, the semi-popular Sunbeam Alpine received a massive dose of performance adrenaline. Under the careful tutelage of Carroll Shelby, the Alpine entered the scene as a conservative, suburban Cobra. Sporting a shiny new, small block 260 cid Ford V-8, the Sunbeam Tiger was born and Americans gobbled them up. Unfortunately, the car's life span was short. Imported to the United States by Chrysler Motors Corporation, it didn't take long for the corporate heads to convince themselves that marketing a car using the competition's engine was an unproductive practice. And so the Tiger became a classic.

Today a clean Tiger costs plenty, if one is lucky enough to find one for sale. Stock Sunbeam Alpines, on the other hand, are still available to the discerning buyer of slightly used sports cars for a more reasonable amount. Unfortunately, the four banger just doesn't have the pizazz of a Ford V-8.

John Thomson of Fort Bragg, North Carolina set out to solve the problem of giving more performance to the Alpine without the expenses and radical changes required to shoehorn a Ford V-8 into the Alpine. To make a Tiger out of an Alpine requires new steering, suspension changes and radical surgery to the fire-wall.

John's first step was to locate a Sunbeam Alpine. After a search of several months, he discovered a 1967 Mark V sitting outside of a garage in a small North Carolina town. The engine, or what was left of it, was nestled in the trunk. Mice had set up housekeeping in the seats and three wheels were missing. He was shrewd enough to negotiate a deal of $260 for the remainder of the car. Next, was the acquisition of a wrecked 1973, V-6 Capri with only 18,000 miles on the odometer. For 656 additional dollars, a complete new drive train and wheels was available for installation in the Alpine.

The second step was to combine these two fugitives from a junk yard into an inexpensive substitute for the Sunbeam Tiger, a "Mini-Tiger." And why not? The Tiger was the product of a Ford V-8 in an English roadster and the Capri, a German Ford V-6, in an English roadster could have been the next step had the car's life not been so short.

The swap, although not a "bolt in" conversion, was not that difficult and anyone with a fair mechanical knowledge and the tools and equipment could easily duplicate the project.

THE ENGINE

Since John wanted the steering and front suspension to remain unchanged, the location of the motor mounts required the construction of 3/8" steel extensions bolted to the V-6 block. Next, a 3/8" steel plate was bolted to the front cross-member of the Alpine. The engine was now supported at the front in the same manner as the old cast iron four. The stock rubber mounts from the Alpine were used to support the engine from the cross-member. This is only one method and the only important thing to remember is the fact that the engine must be supported at its front to use the existing cross member mounts.

The mechanical fuel pump interfered with the frame and was therefore removed. An electric pump was then mounted close to the gas tank to provide the go juice to the carburetor. In order to retain the power brake booster in the stock location, the alternator on the 1973, V-6 Capri engine was moved from the right to the left. This was accomplished using the alternator mount from a 1974 Capri V-6.

The stock Alpine radiator was retained and the only modification to the Capri engine was to reweld the bottom water pump outlet so it came straight out rather than down. Since the outlet is aluminum it was necessary to weld it using a heliarc.

Tubing headers were constructed by hand in order to bypass the steering box and cross linkage. No cutting of the frame was required.

By using a custom chrome air cleaner, no problem was encountered with hood clearance. It should be noted that the engine, complete with carburetor, was lowered into the chassis and the hood buttoned down. The motor mounts were then constructed from wooden templates and fitted from below. During this time, the engine was supported by a hydraulic jack from below. Care was also taken to ensure that the steering cross arm which operates behind the engine did not rub on the bell housing or engine block when the steering wheel was turned.

The last problem was to hook up the Capri wiring to the Alpine wiring. John finally decided to use the complete Capri wiring harness attaching it directly to the Alpine dash. He even incorporated Capri switches, clutch and turn signal indicator. The turn signal indicator now operates the high beams and horn in the Sunbeam.

THE TRANSMISSION

Rather than go through the problem of adapting the old Alpine 4 speed to the V-6, John elected to go with the newer lighter Capri transmission. Using two pieces of angle iron, the Capri transmission bolts right to the cross frame of the Alpine. Again, no cutting was necessary. The shift linkage was shortened 4 inches and a metal box was constructed and attached to the transmission to support the stock Capri shift lever. The lever was bent at a 30 degree angle to allow clearance between the radio and the shift knob. The Capri mechanical clutch linkage was adapted to the Alpine clutch pedal using parts of the Capri pedal arm. Finally, the Capri yoke was welded to the Alpine drive shaft.

THE REAR END

Initially, the 3.89 to 1 Alpine rear end was retained. Although satisfactory, it was not a perfect mate for the transmission and gas mileage and drivability suffered. Therefore, the Capri rear end was used to make the complete drive train compatible. This was a simple swap, requiring only the welding of the spring pads and shock mounts from the Alpine rear end to the Capri rear end. Helper springs were added and four Capri wheels sporting Goodyear Rally A60 x 13" tires gave the new Alpine traction.

FINISHING TOUCHES

The finishing touches included the addition of a set of bucket seats from an MG Midget, a TR6 leather steering wheel and a coat of 1977 Ford Jade Green paint.

The final project is indeed a "Mini Tiger." The only outward change is a V-6 emblem where the 1725 cc four emblem used to be. The Alpine/Capri V-6 weighs no more than the old Four it replaced. Rear wheel track using the Capri rear end has changed from 48" to 53" but this poses no problems in handling. It is necessary to cut the inside lip of the rear wheel if wide tires are used, but this is required in many swaps and poses no real problem.

Tune-Up Information

by Gary Durborow

I would like to tell you about a few do's and don'ts that I have to explain almost daily to customers at the shop. Each is carried out easily and, although it may cost you more initially, can save you tenfold later.

1. **When you change the engine oil, change the oil filter.** This is rather important. After all, you change the oil to remove the dirt and contamination that has accumulated in the engine, right? Well then, the oil which is contained in the oil filter does not drain with the rest of the crankcase fluid. It stays in the filter. When the filter is left on, you are effectively putting a quart of dirty oil back into the sump. The five or six dollars you spend for a filter is easily offset by the decrease in engine wear experienced with clean oil.

2. **When the ignition breaker points are replaced, also replace the condenser.** Believe it or not, a condenser becomes accustomed to a given set of points. The two parts wear almost equally. The job of the condenser is to regulate the amount and polarity of voltage entering the point set. If you've ever noticed a small tip forming on one breaker face of the points, this is a sign of condenser problems. That tip is actually metal from the opposite face and is moved from one side to the other due to incorrect polarity. This is also a good reason not to file the point faces. When you remove the build-up, you actually are widening the gap because the metal is missing from the opposing side.

3. **Don't leave the thermostat out.**
   Too many times when the thermostat is suspect, it is removed and not replaced with another. The idea behind the thermostat is to regulate the temperature of the engine coolant. In order to do this, it governs the speed at which the coolant is supplied to and from the radiator. Without the thermostat in place, this

cannot be accomplished. The coolant will be moved only by the water pump and by natural convection. At idle, the coolant hardly moves, and at higher speeds it moves too fast. This allows far too much in the way of temperature variation. As it is, the coolant is kept at about plus or minus 10 degrees of the thermostat rating. Without a thermostat this can vary much more either way, and operating an engine too cold can be as harmful as running it too hot.

4. **Always use antifreeze—year 'round.**
   This is especially important on engines with aluminum cylinder heads, as an Alpine has. Antifreeze is not only meant to keep from freezing in winter, but also to dissipate heat in summer. Plain water cannot come close to the same effectiveness. Antifreeze also contains additives to help fight corrosion in the system. This corrosion can be extremely detrimental to aluminum. The cylinder head can be eaten away to the point that it can be used only as a boat anchor. With antifreeze selling for about $6. per gallon, and a good used cylinder head going for about $100., it's not hard to see the savings. By the way, not all brands of antifreeze are compatible with aluminum. Not all of those which are compatible say so on the container either. To be sure, though, stick to using one of the popular brand-name types.

So, you see, spending a small amount of extra time, effort and cash now can spare you a major headache later.

Survival Tactics for Your Air Cleaner

by Rich Bakula

Within the past year, I successfully completed another project. It was the restoration of my air cleaner's metal housing which some of the TE/AE United V attendees may have seen and mistaken as original. The original paint was peeling miserably, but I had an excellent sample of original finish. I found a spray can of a product called "HAMM-R" finish in my local "ARMA" hardware store. This product basically produces a "hammertone" finish, but it can be made to reproduce the exact original appearance of the Tiger air cleaner finish. It is made by Illinois Bronze Paint Company, Lake Zurich, IL 60074, and its part number is 322 Silver. (Ed note: it has been reported that a similar paint is available from J. C. Whitney under part number 15-9398B. The name is listed as "Hammer Tone".) I let the first coat dry a little longer than was recommended, and I made the "texture" coat "spit" bigger drops. After drying, I put an overall clear coat of Krylon "Crystal Clear" on to provide a surface into which grease could not soak and it would enable one to bring it up to a "show finish". Surface preparation was an essential part of this job. Initially, I chemically stripped the old paint off of the air cleaner using Savogran Super Strip (Savogran Company, Norwood, MA 02062 and Addison, IL 60101). Using a wooden popsicle stick, sharpened as a putty knife (30 deg Knife edge). The use of a wooden scraper is important, as the air filter plating (zinc) will be damaged by harder than-zinc tools. Strip the paint completely. Apply Pre-Klean or equivalent, apply lacquer primer, and allow it to dry. Sand, prime, etc., until smooth with #320 paper, then apply top coats as above. I found that Savogran Super Strip also works well on original Nardi steering wheel finishes. However, be careful with the rubber (black insert facing the driver) inlay. Ferrothane High Gloss matches the original finish superbly after three or four coats. Probably, the same procedure works on wooden dashboards.

Throttle Cable Repair

by Dan Cameron

For those of you who are driving your Tiger with the original throttle cable intact, you may be running on borrowed time. Worse than that, you could be in for some excitement if your throttle sticks in the open position. This happened to me recently when I mashed the pedal to the floor in first gear. After regaining my composure, I found the original cable (actually a wire) had fatigued to the point where it easily kinked, over-riding the force applied by the return spring. What I thought to be an easy fix turned out to the contrary. Our Tiger supply houses as well as the local speed shop could not come up with the replacement parts. Because of the safety implications, to recommend a solution to the problem is not my intent. I will however, share with you how the cable was repaired. The original throttle cable sheath, being of the proper length and design, was retained. I went to a local bicycle shop and purchased a heavy duty replacement brake cable (not shifter cable). These are the same diameter (.042") as the original wire. The cable comes with the appropriate ends having small die cast stops molded on them. One end looks like a "drum" and the other end looks like a miniature "bottle "similar to the ones you get on Northwest Airlines. While at the bicycle shop, also purchase a cable retaining bolt. This is a small bolt with a hole drilled in the threads perpendicular to the bolt centerline. Next a trip to the speed shop to purchase a Chevrolet throttle cable adapter, Edelbrock # 8009. And finally, to the auto parts store for a package of 1/4" screw ring electrical connectors. The latter can be found on most auto electrical displays. The installation procedure is as follows:

1. Cut the bicycle cable in half and save the piece with the bottle-like end.
2. Feed the cable through the 1/4" electrical screw ring from the bolt hole side until the bottle-like projection limits the travel. I was able to push the neck of the "bottle "into the wire opening eliminating the need to crimp the screw ring.
3. Insert the cable through the original Tiger cable sheath and into the interior of the car.
4. Put the throttle cable adapter (by Edelbrock) through one of the holes in the carburetor actuator plate, slip the "eye" of the electrical screw ring over the bolt, and retain with flat washer and cotter pin supplied.
5. Finally, place the bicycle cable retaining bolt in the throttle pedal arm using the same hole as original cable and feed the new cable through the hole in the threads of the bolt. Adjust cable for the proper length and retain with a flat washer and nut. In closing, a few final remarks: Be sure that when adjusting the cable for tension, the pedal stop should be timed perfectly with the throttle in the full open position. Also, don't over-tighten the small throttle cable retaining bolt. They are soft and with the added hole, prone to fail.

The Right Header Gaskets

by Dan Cameron

When installing exhaust headers, be sure to use the proper gasket. The metal backed, over the counter variety, are generally for cast iron exhaust manifolds. Header gaskets are fiber-asbestos composition and look like cardboard. The metal gaskets are prone to leak.

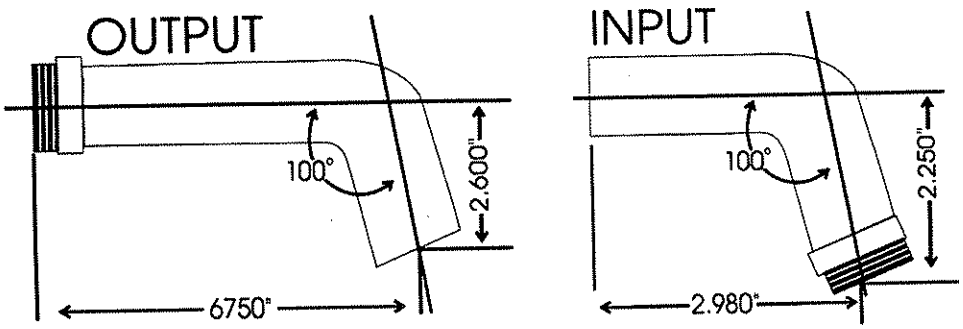
Remote Oil Filter

by Dan Cameron

Many articles have been written over the past several years that address changing the location of the Tiger's stock oil filter from the engine compartment to under the left front fender well. Providing you are not trying to remain as near stock as possible, moving the oil filter out-board has at least two advantages: -Ease of changing the filter due to the spin-on feature -It is one more item removed from the engine compartment providing the potential for increased air flow I recently went through this procedure and am very pleased with the results; however, many times along the way I felt like throwing in the towel. What made the job so difficult was finding a satisfactory block-off plate (adapts to block) that would clear my headers. This is not a problem with the stock exhaust system or with the headers that go over the top of the engine mount. If you have either of the latter two conditions, you can use Rapid Cool's (Hayden Inc., Corona, CA) block-off plate #103271-01. As opposed to other makes, it was designed to port straight out of the block (90 degrees to crank) or port to the side (parallel to crank toward front of car). I thought the block-off plate with side porting would solve my clearance problem with the headers. So I went ahead and ordered it along with the remote oil filter mount itself, #102104-01. The filter mount, by the way, works great. No such luck with the block-off plate. Significant persuasion with the old hammer on the old headers was going to be required to get it to fit. After many hours of deliberation, I finally concluded there just was not an adapter manufactured that would do all I wanted it to do: -clear headers and frame -adapt to 0.500" I.D. Stainless braided hose -look professional The solution to the problem—use stock Tiger block adapter and fabricate hose end fittings to interface with braided hose. It sounds simple, but the Tiger's block adapter requires 0.500", inverted flare, male fittings. These are the same as on the original hoses which can be cut off and used. If you elect not to butcher your old hoses, you are in for a treat. The 0.500" inverted flare nuts must have been a one-time build in merry old England. Most of my parts suppliers said they had "just what I wanted"—wrong!! When the stock was pulled from the shelf, 0.375" was about the largest available. The material required to fabricate the hoses is as follows:

a. (2) 0.500" inverted flare male nuts
b. (2) hose adapter fittings (fit into 0.500" I.D. hose). These are conical with a corrugated O.D. The ones I used were manufactured by Gates. They are available at most hydraulic hose repair shops.
c. (2) ten inch long pieces of 0.500" I.D. x 0.049" wall seamless tubing
d. Fifty-one inch length of 0.500" I.D. teflon lined, braided hose
e. The stock block-off plate and remote oil filter mount mentioned earlier The first step in constructing the oil lines is to fabricate the hose end fittings.

The tubular portion that mates to the block-off plate will be a different length (shorter) for the incoming oil line as compared to the oil line going to the filter. The sketch provided should get you started in the right direction.



Remember, "two things that aren't the same are different"—this applies to Tigers as well. Double check length and angle of bend with coat hanger wire on your particular car before going too far. Note that in each case the angles (100 degrees included), and radii of bend (0.750"), are the same. I purchased my tubing from an industrial supply house that manufactures hydraulic lines and had them do the bending. Standard tube bending equipment limits the tightness of the radius before collapsing the tube. They can also put a double flare on the tube end that will guarantee a positive seal. The second step is to take the two steel lines with flared nuts to your local welding shop to have the hose fittings brazed or silver soldered to the end opposite the flared nuts. The latter is really the preferred method for seal and appearance. With the completion of the hose end fittings, I took them to an automotive parts house that specializes in making up air conditioning hoses, oil lines, etc. Using two different length hoses, 25.5" for the line going to the filter and 26.5" for the line returning from the filter, I had them swage (crimp) the braided lines to my hose end fittings. Again, be sure to check the measurements for your specific application. Now, for that added professional touch, paint the hose end fittings with Zynatyte Super Chrome Epoxy Paint prior to installation. Finally, to install the completed lines, cut two 0.875" holes in the left hand side of the engine compartment sheet metal that will access the inside of the fender well. I drilled (rotary saw) holes 5.375" and 7.125" back from the radiator bulkhead, just in front of the leading edge of the header coolant tank. Next, place 0.625" I.D. rubber grommets over the two hose lines and you are ready to install the lines in the car. Start with the line supplying oil to the filter. Coat the threads with teflon liquid seal or tape and screw the inverted flared nut to the block adapter. This will route the line forward and above the steering column link. The second line, that which brings oil from the filter and into the center of the block adapter, is routed under the column steering link, then runs parallel to the first line to the remote oil filter. Next, secure lines to remote filter. Position under the fender as close to the headlight bucket as possible. Mark this location, drill mounting holes and bolt in place. I know it sounds like a lot of work, but it is not so bad once you get started. Good luck!

Water Pump Removal Procedures

by Paul Burr 3/18/91

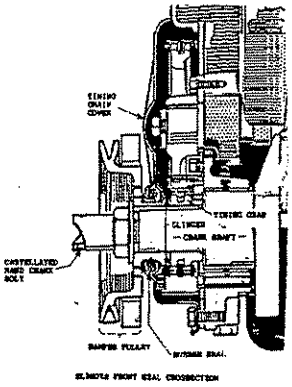
I recently changed the water pump in my Tiger and would like to share this information with you. At first glance, getting the thing out looked like a nasty job, but once underway, it went smoothly. First, drain the radiator into a suitable container by opening the petcock at the bottom of the radiator. Easy so far, right?

After it drains, remove the hoses from the expansion tank, heater and the radiator inlet and outlet hoses. Now would be a good time to replace them, if need be. Though it is possible to change the pump with the radiator in place, I chose to remove it to gain some room and save the flesh on my knuckles. Take out the four mounting bolts, work the fan shroud clear, and have someone help you lift the radiator out. Now would be a good time to send it out for a good cleaning and to patch up any leaks it might have. Now for the main event. Remove the generator and its lower bracket and take off the fan belt. Again, replace if worn. Unbolt the fan and pulley from the water pump. Remove the pump mounting bolts, one at a time, and tag them so you can get them back in the right places. The pump should come off with a couple of taps with your fingers. Anymore force than that means you forgot to remove a bolt. Once out, clean the old gasket off the engine. In case you did not know, your aluminum case water pump is different from the cast iron replacement ones. The pulley hub is about 1/4-inch lower and shaped differently. This leaves you with a couple of options. I had the pulley pressed off my old pump and onto the cast iron replacement. The machine shop only charged $8 and it works perfectly. But, be careful to choose a good shop because a slip-up will be costly to you. A second way would be to find a rebuilder that will do the aluminum pump and return it to you. This is more costly in time and money, but you retain the "original look". Once the pulley hub is squared away, you reassemble everything. Assembly is the reverse of removal. Make sure all the gasket surfaces are clean (use a scraper) and dry. Use a light, even coat of gasket sealer on both surfaces. Use a new gasket and be careful not to hang it up when positioning the water pump. Put the bolts back in proper order and torque to 15 foot pounds. Put the fan pulley and fan on water pump. Bolt in generator bracket and generator. Put fan belt on and adjust. Install radiator and shroud and reconnect hoses. Add coolant, let the engine run for 15 minutes and check for leaks. Not counting parts chasing and beer breaks, this was about a four hour job for me. The squeal is gone, the car runs cool again and the heater output has increased. Not bad for the time invested.

Alpine Front Oil Seal Revisited

by Steve Finberg

Of late, Alpine engines have exhibited a chronic tendency to leak oil from the front timing chain cover seal. As has been explained in an earlier tech tip, this seal is designed as a slinger. The oil is spun off the crank shaft back into the timing cover by a spiral groove and disk. Russ O' Brien published a tech tip in the October, 1984 TE/AE NEWSLETTER (Vol.9,No.8) describing a modification to the front oil seal. He brazed in a custom adapter and used a standard American rubber oil seal. The installation required a special jig and some fancy machining. Having owned an Alpine since 1967, I had doubts about the need for a modification; the front seal did not leak when new and I did not see how the slinger mechanism could deteriorate. Recently, while transplanting an engine into my Series V Alpine, I had occasion to pull the timing chain covers of three different 1725cc engines. All had chunks of rubber lodged in the oil drain area at the bottom. A quick reference to the factory service manual and parts book showed the missing rubber seal. A close examination of the parts book shows a rubber "o" ring-like gasket near the timing gears, but it was not obvious where it went. It fits in a well in the front timing cover where it seals the gap between the slinger disk and the cover plate. See illustration. It is my guess the "high quality" English rubber will last only a few years as it is under constant



pressure, but it is fairly easy to replace. To replace the seal, first drain and remove the radiator, then disconnect the fan belt. Next remove the starting handle (hand crank) castellated bolt. The right tool to do this is a 1-5/16" 12 point deep socket (Snap On P/N S421) and a breaker.

I have seen it removed with a pipe wrench, but you will never be able to retighten it adequately without the socket. Early engines (before S/N B395005604) had a tab type lockwasher which must be bent clear before loosening the castellated bolt. Next carefully remove the damper pulley with a steering wheel puller, using the two tapped holes in the center section. Be careful as new dampers are not available. Remove and save the woodruff key. Before removing the timing cover, clean the encrusted grime from around the cover to keep it out of the engine. Remove the timing cover by removing 13-3/8" bolts. Once open, clean out any loose rubber fragments and inspect the condition of the timing chain, rubber tensioner, and the timing gears. When new, there is virtually no slack in the chain; but the gears are quite a bit pointier than expected in most American engines. My decision was to replace all the pieces as I did not want to go back in later. Remove the old cover gasket by thoroughly scraping. Inspect the timing cover for flatness as over-tightened bolts could have distorted the flange. Straightening the sheet metal will allow the new gasket to seal better. A light coat of gasket cement on the new paper gasket is appropriate. Be careful as too much will ooze out and could get in the oil supply and cause serious damage. Clean the inside of the timing cover and install the rubber gasket in the well after giving it a light coat of oil for initial lubrication. Be sure the slinger disk is oriented properly and replace the cover. The factory calls for a special tool to properly center the cover hole around the damper shaft, but who has it? An alternate technique is to place a piece of 3 to 5 mill shim stock (1/2" x 5-1/4") around the damper shaft and use that to centralize the cover. Assemble with the shim in place and tighten a few of the hold down bolts. Remove the damper and shim, tighten the remaining bolts. Tighten only until the compression lock washers flatten—over tightening will only distort the cover (WHAT? You have not installed lock washers on all the engine cover bolts?) Reinstall the woodruff key and damper, tighten the crankshaft nut as tight as you can. Use a socket and a breaker bar and secure with maximum force you can muster, short of breaking bar. It will be necessary to secure crank by holding fly/wheel. Reinstall the fan belt and radiator. After 2500 miles in 3 months, I am very satisfied with the results. Absolutely no seepage is evident and oil consumption is running about one quart per 1500 miles.

Rejuvenating Battered Cylinder Heads

by Ron Fraser

Okay, maybe it is time to replace valve seats. You need:

1. A reliable auto machine shop that can handle the job.
2. Hardened exhaust valve seat inserts, high chromium or 60% alloy.
3. High quality exhaust valves.
4. Silicon-aluminum-bronze valve guides. The head should be heated to 300 to 400 degrees F and the inserts cooled in dry ice for 10 to 15 minutes.

"It is imperative to use a heat transfer compound such as Fluid Weld when installing inserts..." Fluid Weld - Seal - Lock International Glenside, PA 19036 Inserts: Martin Wells Industries, Well Tite Div., Box 01735, Los Angeles, CA 90001. Safeguard Engine Parts, Inc., Manley Valve Div., 400 N State Street, York, PA 17405. This article was written as an information bulletin only. There are no guarantees expressed or implied for any of the products or manufacturers listed.

Header Castings

by Curt Hoffman

Many people talked to me about my headers and I thought I would pass along what I did to protect them. The headers on my car when I bought it were rusty with pinholes and would not pass Pennsylvania inspection. I looked at headers in other cars and noticed the same problem. I figured with the problem associated with changing headers on a Tiger I would try to protect them as best I can. It just so happens fate stepped in and I found a test report in an automotive magazine the very next month (1984 Car Craft Annual). In the article, the advantages of using the new hi-tech aerospace developed coatings for headers was discussed. I decided to have mine done by the firm listed: Hi-Performance Coatings, 1107 Cornell Parkway, Oklahoma City, OK 73108. They coat the headers inside and out with an aluminized ceramic with some chromium and magnesium thrown in as well. They coat the headers with a black, blue, gold or chrome-like finish. I chose the latter. Total cost with shipping was $146.16 in June, 1986. Turn around time was just a couple of weeks. The key advantage of these coatings over aluminum, chrome, etc. is the resistance to chipping and the headers can be coated inside and out to prevent internal corrosion. After one year and about 4000 miles, my headers look like the day I installed them (except for a little oil I burned on from an oil hose leak that I have not scrubbed off yet). The price obviously increased the cost of my J.C. Whitney headers considerably, but it at least appears that I will not be buying and changing my headers in the near future—hopefully never!

Relief Valve Change Can Cure Alpine LOP

by Tom Ehrhart

Most Alpine engines die and are carried to their graves as a result of the internationally dreaded LOP disease. LOP has been the Achilles heel of the Alpine since the car's infancy. In fact, LOP can be considered as a influential factor when Tan Garrad thought up the concept of the Tiger.

LOP or low oil pressure, like any disease is survivable with an understanding of its causes. It even can be cured, leaving the patient with a perfectly normal life. According to the factory manual, normal oil pressure is "40 to 45 pounds when hot" (and above 2000 rpm, according to me). And, they aren't kidding. If your oil pressure is below 40 pounds, you'd better start looking for a hospital for a cure or a graveyard if you neglect this warning period.

An Alpine engine will run just as long as a Pinto, Volkswagen or Chrysler slant six engine under normal conditions, if properly and regularly serviced. The design of the Alpine engine demands regular service (oil changes, etc.) which the above - mentioned engines can do without and still run just fine. Unfortunately, our engines have been totally neglected through the years, making them look worse off than they really are The effect is LOP disease, resulting from premature wear of various components.

Now that we understand how we've been blessed with LOP, let's look at what actually causes it.

Rootes engineers designed our engines to run at very close tolerance. They did not allow for abnormal wear. The engines are designed so well that the normal wear rate of internal components is rather uniform. For example, the rings, timing chain, cam and rod bearings, etc. all deteriorate at the same rate, necessitating replacement all at the same time.

With these characteristics, it is obvious why Alpine engines must be totally rebuilt for satisfactory results. A partial patch job is not usually worth the effort and YOU WILL PAY! This discussion is not meant to address engine rebuilding issues, but to serve as a means of understanding LOP problems that follow. LOP almost always (except in racing) proceeds a catastrophic engine failure. It is related to one of two areas. The first is excessive wear of engine rod, main and cam bearings and a loss of oil pump efficiency resulting from normal wear.

The second is a stuck oil pressure relief valve. Although a stuck relief valve is not the cause of most LOP occurrences, it does represent 'more than its fair share of Alpine owners' engine maladies. When investigating LOP, it is only natural to check out the most convenient things first. Of course, the relief valve, located just below the oil filter, is the easiest thing to check. It should be checked first, too, to assure its proper operation before tearing into the engine. A discussion will follow later concerning the relief valve.

Now that we've cleared the relief valve of contributing to LOP let's get into the engine The major cause of LOP is excessive rod, main and cam bearing clearances. Maximum allowable, according to the Rootes factory workshop manual is: Rod .002", main 0025" and cam 003". Except for the cam bearings, these dimensions can be verified by using a material called "Plastigage." It's available at most automotive supply sources and even from J.C. Whitney. It is not possible to check cam bearings with this material nor is there an easy way to verify ram bearing clearance by the average car owner.

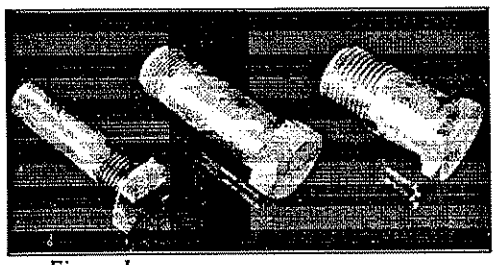


Figure 1

A good rule of thumb is: if engine mileage is more than 75,000 and/or rod and/or main bearings are marginal, the cam bearings need replacing too! The oil pump system does not have the capacity to accommodate the increased oil flow requirements if rod and mail bearing clearances exceed those specified. It will be necessary to either install new bearings and, perhaps, have the crankshaft re-ground. Oil pumps are not a major factor with LOP, although, previously stated, they do lose some capacity with use. Rebuilding of an oil pump by the average car owner is very easy and will be the topic of another tech tip in a future newsletter.

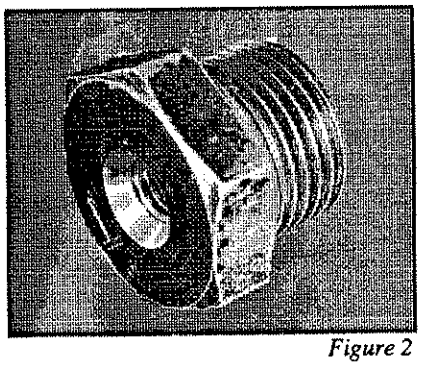


Figure 2

It is entirely possible in most cases to cure LOP with repair of rod, main and cam bearings' tolerances and the modification that follows:

The oil pressure relief valve is a component in our engines that has a significant effect on oil pressure as a potential failure mode. But, it too, can be modified to increase oil pressure. It's an easy task and can be undertaken by anyone with a few

basic tools. There are three types of relief valves in Alpine engines, depending upon engine serial and series number. (see Figure 1) They appear physically different, but all operate in the same manner; i.e. excess oil supplied by the oil pump causes the spring-loaded plunger to open up past the holes on the side of the valve, in turn allowing excess oil to drain back down into the oil sump.
If a relief valve is "stuck", causing LOP, it will be obvious by noting that the plunger does not move freely nor does it completely close the side ports.

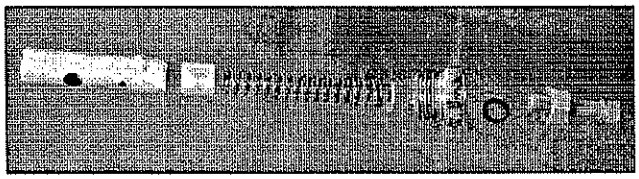
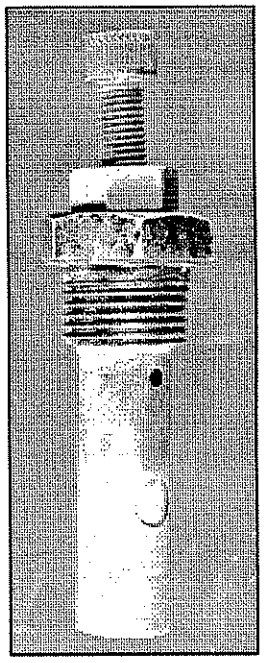


Figure 3

Modification of the relief valve will cause engine oil pressure to be in the 50 to 70 pound region. Pressure in this region will do nothing but enhance engine durability for street driven engines and are absolutely mandatory for race engines. Start the modification by removing the relief valve with a 1-3/16th" wrench. Again, refer to Figure 1 to determine the type of valve you have. For this article, the one on the left was used (1725cc). The other two are used in the 1592cc and 1492cc engines.

The 1725cc valve is disassembled by using a propane torch to unsolder the copper tube from the threaded housing. The other valves are disassembled by carefully filling or grinding the ends off. They are re-assembled by peening over the ends that were filed away. The remaining modifications are the same for all three valves.
The next process involves drilling a hole through the end and center of the valve and tapping it with 10-32 threads. Then tapping is done, countersink the hole slightly. (see Figure 2 for complete operation)

Figure 4



Organize the components as shown in Figure 3. Note the addition of a small disc between the spring and the threaded housing, a rubber "O" ring and a bolt with a nut.
Re-assembly begins by placing newly acquired disc into body of threaded housing. Stretch and re-assemble in the reverse order of how the valve was taken apart. Place the small "O" ring on bolt and screw the bolt into the valve, but do not cause the disc to move. Lightly secure the nut. (see Figure 4) Install the valve into the engine. Then start the engine and get up to normal operating temperature. A 15 minute trip at highway speeds should do nicely. You should already have noticed a small increase in pressure. Now, with the engine running at 2500 to 3000 rpm, loosen the nut and turn bolt in until desired oil pressure is obtained - about 50 pounds or more for street use. Remove valve from engine, clean in a solvent and smear silicone form a gasket around the threads and "O" ring before tightening the nut for the last time.

One word of caution with this modification: it is possible under certain conditions that with the engine cold, the oil pressure could go well over the gauge limit. The end result is a blown gauge and a messy dash and shoes.

If the oil pressure goes over 90 pounds when cold, a change to a thinner oil (20W50, etc.) is warranted and/or the rod and main bearing tolerances need checking.

One more note on LOP: Alpine engines must run within one quart of the full mark on the dipstick. Hard cornering causes the sump to go dry, if near one quart low. You are better off with too much oil (over-filled) than on the low side.

Adding an Inline Fuel Filter to Series V

by Steve Finberg

The existing mesh filter in the fuel pump has never seemed satisfactory to me. First, it is too coarse to keep fine crud out of the carb needle valves, and second, because large crud from the fuel tanks can clog the fuel pump at the right-angle inlet before the mesh. A standard replaceable, cartridge-type, inline fuel filter can be added in the line before the fuel pump.

The fuel line is removed from the pump and a 6-inch piece of 5/16th" gas line is slipped over it, leaving the compression ferrule in place. Secure it with a hose clamp. Together, they are attached to the firewall brace tubes with a nylon wire tie.

Gently bend the gas line as necessary. A 5/16th" inline fuel filter connects from there with 18" of 5/16th" gas line to the pump. At the pump, 2-1/2" of copper 5/16th" O.D. tubing and a compression fitting completes the installation. All connections should be secured with hose clamps.

In addition to permitting the use of an inexpensive inline fuel filter, there are several additional advantages.

1. It prevents gravity feed, since the end of the line is now higher than the tank when secured by the brace.
2. It isolates the fuel line from vibration of the engine, as suggested in an earlier Tech Tip.
3. It provides an easy point for an emergency gas tank connection in the event of a fuel line blockage. While on the road, I have found it almost impossible to remove the fuel line at the pump, especially the plastic line found on Series V Alpines.

(Tech editor's note: This fix can also be applied to earlier model Alpines which utilize the same mechanical-type Solex fuel pump. If the fuel shut-off is still attached to your pump, simply remove it and proceed according to Steve's directions.)

High Pressure Fuel Line Failure

Rootes Service Bulletin:
TO: All Rootes Dealers
Model: SUNBEAM TIGER (260)
Subject: High Pressure Line Failure

Isolated cases of failure of the high pressure oil line, top of oil filter to cylinder block, have been brought to our notice due to chafing of this pipe against the universal joint of the steering column.

This, if allowed to continue, could eventually cause break-through of the hose and complete loss of oil.

Will all addressees please bring this to the attention of all service personnel, to ensure that on P.D.I., 500-mile free service, or at normal servicing periods, the clearance between the oil filter pipe and the steering universal joint is sufficient to prevent this chafing.

ROOTES MOTORS INCORPORATED
KENNETH LANGRIDGE
GENERAL SERVICE MANAGER

Fuel Line: A Nasty Design Problem

by J. Charles Watamess

If you own an Alpine, you may have noticed the fuel line from the tank to the engine is a single piece of formed steel tubing. In most English cars, you will find a piece of flexible hose connects the solid line from the tank to the inlet of the fuel pump. I recently had this line fail right at the fitting where it enters the pump. Fortunately for me, it happened in my driveway and was not serious. However, when it fails, the entire contents of the fuel tank siphon all over the ground.

Last evening, I heard of someone with an Alpine that recently had the same failure. Unbeknownst to the driver, the fuel had spread across the bottom of the car. Upon stopping at a traffic light, it ignited under the hood causing an explosion. The siphoning gasoline fed the fire and the car was completely destroyed.

The easiest solution to this problem is to make a stub piece of tubing for the fuel pump inlet. The main fuel line should be cut back near the frame and a length of neoprene hose should be inserted between the two using high quality clamps. Be careful when cutting the lines. Under no circumstance should you use an incandescent trouble light. A couple of years back, I was removing an inlet line to a fuel pump and splashed some gasoline on a trouble light that broke and set both me and the car on fire. To make matters worse, the continual flow of gasoline fed the fire. In was extremely lucky in being able to extinguish it, but before I could do so, extensive damage had been done to the car.

It is always a good idea to have a fire extinguisher immediately at hand when working on the fuel system.

Fuel Tanks

by Bob Pennell

When the tanks were removed from the car, there had been no leaks. Upon inspection, there appeared to be only superficial rusting on the bottom. So, I wire brushed and sanded to bare metal, then metal prepped before priming and painting. The interiors were coated thoroughly with Bill Hirsch gas tank sealer, and the tanks reinstalled in the car.

As soon as the tanks were filled with gas, the left side began to leak at the rate of about one cup per hour. Suspecting a loose connection at the balance pipe, I removed the trim panels and felt around under the hose connections, but no leaks were evident here. So, out came the left side tank, and external inspection uncovered no obvious point of leakage. The tank was dried out, and another application of the Hirsch sealer added. This time, the tank was partially filled with gas and allowed to sit for several days outside of the car. No leaks, so back in the car it went and everything was buttoned up in the trunk area.

Several weeks elapsed, and then the dripping started again, this time at a slower rate than before. Upon removal a second time, a pinhole was evident at the bottom of the tank where a small amount of sealer also had bled through.

Enough fooling around, I thought, and the tank was sanded down to bare metal and the entire bottom encased with fiberglass cloth and epoxy resin, then repainted and reinstalled. So far so good, no leaks the third time around. The right side will probably start any day now, the way my luck seems to run. The point of this is simply—if you observe any surface rust at all on the bottom of the tank, don't mess around—glass it!

(ED. NOTE: Alumi-Lead and other similar compounds are also good for this job.)

Crud in The Fuel Tank

by Steve Finberg

Much as it surprises most U.S. mechanics, the Limeys painted the insides of our gas tanks! This paint is now starting to flake off (at least on my 3 cars and several others in New England). Don't get me wrong; I am not quite complaining. Everyone with whom I have talked thinks paint would not last a few weeks in a gas tank, let alone more than 15 years. In fact, the paint is not dissolving but rather is losing its affinity to the metal. The paint flakes off and tends to clog the cross pipe to fuel line connection.
This can lead to many confusing problems, but primarily results in gas starvation. Before the line is totally clogged only a trickle can get through. This may be enough at idle or around town, but can lead to overheating or stalling at speed as the carbs are forced to run very lean. Eventually the line will clog completely, either at the cross pipe or at the fuel pump. I have seen a fuel pump changed only to have the problem reoccur in a few weeks.

In an Alpine, the first sign of a problem will be the small black curly flakes in the fuel pump bowl. However, this is not where the system usually clogs. The clogs occur at (1) the right angle inlet to the fuel pump (fixed with an in-line gas filter),
(2) at the junction of the gas line to the cross pipe at the gas tanks.

The blockage at the fuel pump can be cured by removing the fuel line and pushing it out, with a small wire, from the pump bowl. The blockage at the cross pipe can be cured only temporarily with compressed air, by blowing it out from the fuel pump end. It will generally return within 10 to 20 miles. A slightly more permanent fix requires removing the gas line at the cross pipe and pulling the crud out with a hooked wire. Be prepared for a slight trickle of gas as the line is first removed, and a major flood as the blockage is removed.

Unfortunately this is only a temporary fix, as the paint flakes off slowly and will block up again sooner or later. Watch the filter for first signs. It seems to clog sooner in the summer than in the winter.

A permanent fix requires removing the fuel tanks and stripping off the inside paint. This is easier said than done. My first approach was to take the tanks to the local radiator shop. The owner assured me that one day in his tank would rot out any paint completely. A week later, only about 80% of the paint had been removed, the rest looked slightly flaky. He didn't think much more would come out, and I think he wanted the space back. Next I tried several paint removers and solvents available from my lab, but none even touched the stuff. Finally, I took a length of sharp edged

window sash chain and shook it around inside the tank. A thorough shaking removed the rest of the paint. I then washed the tank in water to removed the loose flakes and dust, and any remaining radiator shop fluid residue.

A thorough inspection of the tanks and cross pipe (also with paint removed) revealed several pinholes which the paint may have blocked. I brazed them shut. The exterior was then wire brushed, primed and painted gloss black.

In the week between the washing and the planned installation, the tank showed some slight rust. I decided to coat the inside with "Hirsh" gas tank sealer, as advertised in Hemmings Motor News. It is advertised for coating rusty antique gas tanks, and supposedly seals any rust and plugs pin holes. It is a yellow, very sticky paint, which, when applied and sealed in a tank, exerts quite an outward pressure, forcing it into any pinholes or seams. The company assures me that it will not flake off or dissolve. As I have just finished, I cannot yet report any results.

While the tanks are out is a convenient time to inspect tail wells for accumulated dirt and rust, and to restore the inside paint. Having the tanks out makes body work in that area so much easier.

To get around temporarily while the main tanks are out, a marine tank can be connected to the fuel pump or filter. An inexpensive one for this purpose is the Sears Game Fisher Tank.

Carburetion

by Scott Woreth

Carburetion - Street Driving Modification

Most performance increases are accompanied by a compromise somewhere along the line. This modification is probably an exception because (unless you put your foot on it) gas mileage should not change. There are several manifolds available for the Ford 260/289. Most are raised higher than the cast iron manifold that they replace and may present hood clearance problems. From my experience, I have found that the least expensive modification that you can do to your stock 260/289 and get the best performance increase from, is to install:

1 - Ford cast-iron 4-barrel manifold
2 - 465/500 CFM Holley 4-barrel or AFB (Carter)
3 - A Ford Dual-Point Distributor-Ford part #C502-12127-E
4 - Good Copper/Steel Spark PLug wires-Ford part #C402-12259-C

Don't misunderstand the above statement to mean "best". I am taking into account the cost, also.

A Cast-Iron 4-Barrel Manifold can be found in plentiful supply at junkyards for less than $25.00 as opposed to $100.00 plus for a new aluminum manifold. With a small 4-Barrel Carb (465-500) CFM-any make), you will be impressed at the new boost your stock motor will get. The Ford dual point distributor (join C.A.T. and get one for a fair price) and a good set of spark plug wires (steel/copper, not resistive type) makes for a super low budget stock set-up.

I have heard only bad things about the Ford Cast-Iron 4-Barrel Manifold, but for stock driving, you can't beat it. The Cast-Iron 4-Barrel Manifold was not designed to operate in the 7000+ rpm range, but it was designed to operate in the same range as your 2-Barrel Manifold and (if you haven't forgotten) your factory hydraulic camshaft (4400 rpm). What you will get is a nice boost from 2000 up to 4400 rpms. If you stay with a small 4-Barrel Carb, throttle response will not suffer.

A carburetor indirectly delivers fuel to the engine. As the "gas" pedal is depressed, the throttle opens, allowing more air into the engine. As air rushes through the carburetor constriction (called the Venturi), the air speeds up, and at that point a vacuum is created. This vacuum point is where gas from the fuel bowl is fed into the air stream. The faster you go (or should I say the more air you allow into your engine by opening the throttle), the more fuel is "pulled" into the air stream from the fuel bowl. The problem with the carburetor throttle is that when you open up the throttle, the air that was rushing through a small opening, is now moving more slowly through a larger opening. The air stream velocity drops, vacuum drops, and not as much fuel is pulled into the air stream. The car would stumble or stall unless it had a helping squirt of gas (from your accelerator pump) available to overcome this "momentary" change in air velocity. If you understand what is happening, then you can see that a bigger carburetor (bigger than is needed, that is) compounds this problem. A bigger carburetor has a slower air velocity through the venturis, and any incremental change in gas pedal position in results in an even bigger drop in vacuum when you step on it. When you hit the gas, all of the sudden what was going through 2 barrels, suddenly has to go through 4 barrels. Velocity drops way down, vacuum drops and the car lacks response, stumbles or stalls. If you don't believe this, try driving your car without an accelerator pump.

Now, if you can believe this logic, read on. Assume that your 289 engine has to rotate twice to induct 289 cubic inches of AIR into your cylinders. It sounds silly to think otherwise, but at very high rpms, restriction in the intake ports, incomplete emptying of exhaust gases due to muffler back pressure may, and I say may, prevent 100% cylinder filling.

Let's assume you have a 289-271 HP engine rated at 271 horsepower at 6000 rpms. Since your engine is a 4 stroke engine, it takes 2 revolutions to induct 289 cubes (one down stroke is the power stroke, the other down stroke is the induction stroke). Therefore, every other downstroke (or 6000/2) equals 3000 rpms. At 6000 revolutions per minute, your 289 inducts 3000 times (or 289 x 3000).

867,000 cubic inches of air per minute at 6000 rpms
1 cubic foot = 1782 cubic inches
867,000 = 501.7 Cubic Feet of air per minute at 6000
1728rpms., assuming 100% cylinder filling

If you read Ford's specs on the 289-271 HP engine, you will see that the stock carburetor is 480 CFM's. Pretty close to the calculated 502 CFM's.
If you have a stock 289 that peaks out at 4400 rpms, then look at this:

635,800
289 x 2200 = 1728 = 267 cubic feet of air per minute

The stock 2-Barrel carb on your engine flows 280 CFM. Since a 465 Holley is about the smallest 4-Barrel available, this should be an ideal setup on most street cars. The $100.00 saved on an after market aluminum manifold should be well spent on a dual point distributor and a good set of steel or copper wires.

Some Hints on Dual Carbs

author unknown

If you have a dual carb-equipped car — an Alpine I through III, an Alpine V or an Alpine GT — there might be some fine points you have missed in the course of tune-ups. Dual carbs are no great secret: all they take is some care and TLC. But if you neglect them, you will find your vehicle is running like a Mack truck and sounding like a boiler factory when it's idling.

One thing to look for is poor throttle synchronization. With an older car, the passage of time has worked damage and wear on the throttle linkage. It's absolutely imperative to make sure both throttles are opening evenly and at the same time. Make sure they both open fully, and toy around with the linkage between the carbs until you have them opening at exactly the same instant. It takes a little attention, but it pays dividends. The Alpine V Stromberg linkage is particularly prone to problems here.

Another thing that is often overlooked is ensuring the various components are making a tight and leak-free seal. The Zenith carbs on the Series I through III's often work loose, or the manifold would vibrate free just a tad. It might not be obvious — but it would be enough to cause a manifold leak with concomitant problems. The Stromberg manifold is much shorter and better angled to avoid this, but it still bears checking out. Just check all carb and manifold mounting bolts with a wrench and snug them down securely — not TOO tight, as both carb and manifold are aluminum and can be warped.

Also, the workshop instructions on adjusting strangler (choke) controls are suspect. Both Zenith and Stromberg (actually the same people!) have backed off from the "drill in the throttle plate method" in recent years and have simply stated that the best way to adjust your choke is by ensuring that it advances the idle to the "reasonable" speed. With the Alpine I through III, 1000 rpm is probably a satisfactory idle speed; with the Series V and GT, 1500 is probably good. You should try to find the speed at which your car will idle evenly under cold conditions with the strangler out. Due to wear on the engine and carbs, no two engines will have exactly identical solutions, but the above values give you something with which to work.

Balancing dual carbs is a tremendous shibboleth which is actually not at all the arcane secret it's supposed to be. Use a Uni-Syn or similar tool if it's available; if not, use a 1/4 inch rubber hose to listen to the hiss at the air intakes. (WARNING: The PSW tool kit method of comparing piston rise simply isn't accurate enough. Why spend $7.95 for something that's not good enough? What you're trying to do is to ensure that both carbs are drawing evenly — it doesn't have to be exact, just in the ballpark. Try it a couple of times to get it worked out, and you'll find it's really not that hard. I recommend you take the air cleaners off and run the engine hard for a twenty minute run to get the engine warmed up nicely, then work fast. The closer to actual road conditions you are, the more accurate your work will be.

Dual carb setups are more sensitive to throttle shaft wear than are single carbs, and it's important that your exhaust be in reasonably good condition. Double-check your linkage when you are finished to ensure that the throttles are precisely even

and open simultaneously; that is, once you've balanced the carbs and set mixture strength, go back and make sure both carbs open and close at the same time.

You also should balance your carbs at fast idle. That is a fine point even the workshop manuals leave out. Pull the strangler out, check the balance, and toy around with the linkage to make sure both carbs are drawing evenly.

Watching for these few points should improve your idle quality considerably and should improve your car's response, mileage and performance. Dual carb setups are superb and are a fine solution to the problem of fuel metering— but they do require some owner attention to detail at tune-up time!

Enlarged Gas Tank Capacity for Hungry Tigers

by Phil Lindsay

In order to better cope with the California gas lines, I have installed an extra gas tank in my Tiger. My additional tank comes from the early series Alpine I and II. The tank is a horizontal unit which holds approximately 12 gallons and can be mounted in the flat region of the Tiger trunk. The extra tank is installed in such a way that it fills and empties along with the two stock side tanks. Although the trunk space is reduced, I am able to carry lots of spare parts, four tool boxes, spare tire, and still have room for an airlines carry-on suitcase.

The first step involves relocating the battery from the stock Mark I Tiger location (right side of trunk) to the spare tire well. This operation requires a little metal bending and hammering to put a flat bottom on the well. I covered the area with fiberglass cloth and resin for reinforcement. The Alpine tank has a filling pipe on its right side and a fuel pump feedline connection in the center of the bottom back edge. In my installation, the tank mounts "upside down" so that the filling neck points towards the rear bumper and the pump connector is on top.

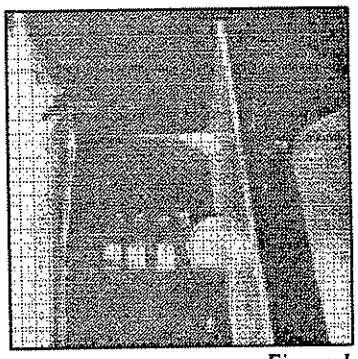


Figure 1

The filler neck is then connected to the main gas line between the side tanks. The pump connector becomes a vent and ties into the side tank vent line. I had my local radiator shop boil-out and leak-test the tank. Once cleaned out, the shop repositioned the filler neck so that a "tee" connection could be made into the main gas cross line. I found that copper plumbing fittings can be purchased with an outside diameter that slips inside the stock rubber couplings. A detail of this set-up is shown in Figure 1.

As shown in Figure 2, the tank is positioned between chassis rails using pieces of steel angle channel. The channels straddle the chassis rails and the tank bolts to the channels with its existing bolt holes. In order to use the space surrounding the sides of the tank, I used masonite panels to partition the area into storage bins.

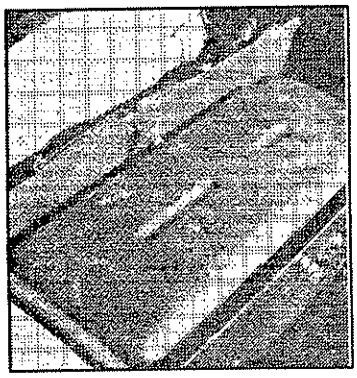


Figure 2

The tricky part of the installation is positioning the tank so that there is enough vertical clearance for the spare tire. Once this location is established, it is necessary to determine the correct combination of copper tees and short

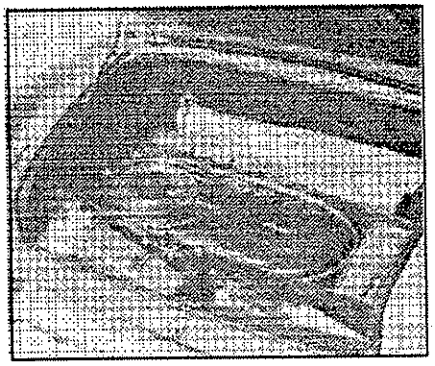
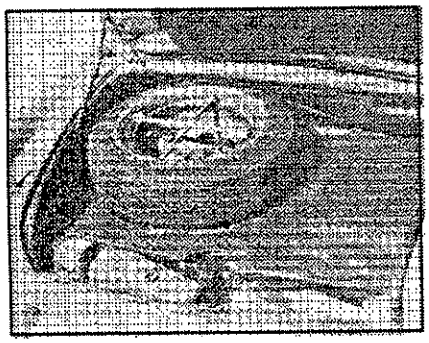


Figure 3

Figure 4



nipples to make the connection between the tank and the main gas cross line. In my installation, the very bottom of the horizontal tank (less than 2 gallons) is positioned so that it doesn't drain out. This could be corrected by mounting the tank higher, but then there would be no room for the spare tire.

Photo #3 shows the various storage areas. There is lots of room for spare hoses, parts, and tool boxes. I modified the false bottom by taking out the battery hump. As shown in Photo #4, the false bottom fits over the tank and permits storage of the spare tire.

I have been using the system for over a year with no problems. Although there is no improvement in gas mileage, my driving range has doubled. I find that the stock gas gauge is accurate at the extremes (empty and full), however, the readings in the midscale are not linear. Obviously, it is extremely important to properly connect the tank to insure leak-tight fittings. I suggest that new OEM rubber couplings (available from Tiger Tom or Sunbeam Specialties) and stainless steel worm clamps may be used. The vent hose must be rated for fuel service.

I am a little concerned about rear end collisions (a la Pinto!). But the stock Tiger set-up is so bad due to the vulnerable cross-pipe mounting, that I doubt that the extra tank is much worse. I have installed an impact sensing switch on the electrical fuel pump circuit in order to shut off the pump in the event of an accident.

What? Another Filter?

This is the one that gets forgotten most often at tune-up time. The fuel filter. Also, to be on the safe side, change the short connector hoses. These can look good and actually have small cracks in them. No under hood fires, please.

Cool Fuel

by Bill Rosenbusch

Don't get stuck on the way to a Tiger get-together in hot weather due to vapor lock at the fuel pump. THE CURE - obtain one piece of foil-backed fiberglass ceiling insulation approximately 18" by 24" and wrap it around the right side muffler (under the fuel pump, foil side out and fix it in place with racers' tape or mechanics wire.

Is There Life After Lead?

by Ron Fraser

I am sure you are all aware that the EPA mandate for lead is 0.1 gram/gallon. This could mean valve recession for any pre-1972 engine. The market is full of lead substitute additives, but do they work? The following is taken from the October, 1987, issue of POPULAR SCIENCE, brought to you by your friendly, neighborhood Energy Czar. First, any pre-1972 engine needs a lead substitute. "The EPA mandated lead content of 0.1 gram/gallon is only a maximum level. There is no minimum required lead content." "Gasoline sold as regular grade sometimes contains only the slightest trace of lead—not enough to provide adequate valve protection for some engines." Also, several oil companies have stopped making leaded fuel, it is being replaced with 89 octane unleaded. Good leaded gasoline may become difficult to find in some areas or it may disappear if this trend continues. Lead Additives 1. Sodium formula called Power-Shield produced by Lubrizol Corp., Wickliffe, OH. It contains sulfur and sodium. 2. Alkyl-phosphate surfactant, called DM-4 produced by E.I. DuPont DeNemours & Co., Wilmington, DE. These two additives have been tested by the EPA, and they do reduce valve recession and may eliminate it in some or all engines. Unfortunately, these chemicals or trade names do not always appear on the label. Maybe this will change. 3. 104 Real Lead - each quart can contains 1.05 gram tetraethyl lead plus ammonium phosphate and provides the valve lubricating equivalent of 0.1 gram/gallon of lead. Cost: approximately $9/quart, treats 20 gallons. 4. New type of leaded gasoline: "The Ethyl Corp. is marketing to fuel refiners a valve protection and octane boost package called Hi Tech 1000, it adds 0.1 gram tetraethyl lead and 0.1 gram of a manganese compound called MMT, to each gallon of fuel." This is supposed to provide the valve protection equivalent of about 0.5 gram lead/gallon. This fuel will appear in the Midwest first and will, hopefully, be advertised on the gasoline pumps.

Alpine Carburetor Replacement

by Bill Spires

For those Sunbeam owners with a mid Series III or later Alpine who may have had problems fixing or finding parts for the Solex 32PA1A vacuum actuated two barrel carburetor, I have an easy, inexpensive (although potentially blasphemous) solution. Replace it with a Holley; the type you can find on any old 2000cc (and maybe 2300cc) Pinto. The one I've been running for over 10 years is a Model No. 12R5228B. It bolts perfectly to the intake with no spacers or adapters, the throttle linkage from the Sunbeam is retained, including the "primary throttle operating lever" which is substituted for that of the Holley. This piece had to be filed slightly in thickness to allow room for the Holley locking washer. The choke is water activated which was accommodated by slipping it in the heater loop. This set up has worked perfectly for me and I thought I would share it.

Fueling the Beast

Packaged performance is one way to describe the interrelated changes that should be taken into consideration when any part or system if modified. Example: If I increase my engine's horse power output by 28% (the net HP difference between a MKI 260and MKII 289) generally no changes are needed! The best way to approach increasing or improving performance isto realize that the entire car is involved. When an automobile is presented for sale by a manufacturer, it is designed to fit the needs of the broadest segment of buyers in its class. This means that a number of compromises are interrelated throughout the vehicle. Example: generally when handling is improved through greater roll stiffness, ride becomes firmer and up the scale to hard. Carburetion works the same way. One of the most common mistakes made in an effort to obtain more horsepower is over-carburetion—that is installing a carburetor that is too large for the application—which results in poor throttle response, decreased economy and a loss of torque and horsepower. The proper size carburetor for an engine is basically determined by the engine's efficiency as an air pump or its ability to intake air and fuel, burn it and expel exhaust gases. An engine's efficiency in doing these three things is largely a function of:

(1) manifold type and design,
(2) intake port size and finish,
(3) valve size,
(4) valve timing (camshaft),
(5) compression ratio,
(6) exhaust valve size,
(7) exhaust port size,
(8) exhaust manifold type and design.

For the purpose of this article and performance tuning, we start with the assumption that the engine's systems are 100% efficient. True efficiency is determined by the above eight basic variables. Now we can set up a formula that will give us a base line or starting point.

RPM= Engine Revolutions Per Minute
CID= Cubic inch Displacement of the engine
1728= the number of cubic inches in one cubic foot
CFM= Cubic Feet Per Minute

First we set RPM at the point in the scale in which we are interested such as 4400 (the horsepower peak for the 260-289 Tiger). Second, since the engine is a four cycle and air is taken in and exhausted on every other stroke, we must divide by two. Third, enter the engine displacement figure (CID) and multiply (4400 2=2200 x 260 = 572,000). Fourth, divide again, this time by 1728= 331.018 CFM air pump rate. (RPM/2 x CID) - 1728 = CFM. These air flow rates (assumed 100% efficient) appear in the following chart, column one. A number of recent dynamometer tests have shown that maximum performance (HP) is derived from the Ford small block engine, single carburetor version when an efficiency factor of .5 is used in determining carburetor size. This provides the air flow rates found in column three.

NOTE: The use of carburetor sizes found in this column REQUIRES improved intake manifolding and cam timing. Column number two, air flow ratings, are found using an efficiency rate of 1.25. These ratings are based on the Ford muscle parts program which calls for a 600 CFM rated carburetor for engines operating in the 5500 to 6500 RPM range with displacements of 289 and 302 cubic inches. It must be remembered that Ford has been generally conservative in carburetor sizing,

preferring more response torque at lower RPM ranges than can be obtained with larger carburetors (which will provide more top end horsepower.) Before we go further, remember 2BBL and 4BBL carbs are NOT rated in exactly the same way. The pressure drop or rating used in rating a 4BBL is three pounds and pressure drop used in rating a 2BBL is 1.5 pounds; this in effect makes the 2BBL look like it will flow more air than it really will in comparison to a 4BBL.For example, a Holley 750 CFM #R4779 4BBL is a square carb (all the venturis and throttle bores are the same sizes). Venturis are 1-3/8" and throttle bores are 1-11/16". Now divide 750 by 2 and get the rating for each 2BBLS, 375 CFM. O.K., so far. The Holley R4412AAS 2BBL is one of three performance 2 BBL's offered. This carb has venturies of 1-3/8" and throttle bores of 1-11/16". Its CFM rating is 500, a difference of 125 CFM or 25% due to the rating procedure difference. Therefore, it is reasonable to re-rate these carburetors so we can apply them to the chart. Holley 350=262.5 CFM, Holley 500=375 CFM, and the Holly 650 = 487.5 CFM (Due to design factors this carb is not recommended for street use or under full power under 4000 RPM).

CARBURETOR SIZING CHART

	260			289			302		
	1	2	3	1	2	3	1	2	3
2000	150	188	225	167	209	251	175	219	263
2500	188	235	282	209	261	314	218	273	327
3000	225	281	338	250	313	375	262	327	393
3500	263	329	395	293	366	440	305	381	458
4000	301	376	452	334	430	501	350	438	525
4500	339	424	509	376	470	564	393	491	590
5000	376	466	564	418	523	627	437	546	656
5500	413	516	620	460	575	590	481	601	422
6000	451	564	677	501	626	752	524	655	786
6500	489	611	733	544	680	816	568	710	852
7000	527	659	790	585	732	877	612	766	918

The basic guidelines for choosing a carburetor are:

(1) For factory stock engines with compression ratios in the 8's, stock cams and cast iron, low rise manifold, use column #1 for best overall performance.

(2) For engines with some modifications such as high rise or Torker type manifolds with stock internals, column #2 should be used. 470 CFM Ford or 450-500 Holley is the best on high rise manifolds, good for 30 HP or 289 and 360.

(3) For engines with improved manifolds, factory type Hipo cams (solid or hydraulic), best results overall will be had using column #2. If headers are used, maximum power will be obtained.

(4) Column #3 will provide maximum power when engines have compression ratios raised to 10.5- 10.7 (289 HP), larger valves, headers, high rise or Torker type manifolds and cam shaft timing on the order or the Ford LeMans Cam (C7FE-6250-A). Only when complete modifications of this sort have been made should this column be used.

The proof of this can be found in the Edelbrock test files on the 289 Torker. Between 2500 and 6000 RPM the maximum HP difference between a 600 CFM carb (R 6619) and the Shelby 715-725CFM (R4118) was as little as 1 HP at 2500

and 6HP at 5000 on a column #2 engine. Remember that the smaller sizes will provide slightly better throttle response, torque and economy than will larger ones in all three columns of the chart. The following is a list of the CFM ratings and the part numbers for those carburetors. A + indicates dual feed and ++ indicates dual feed, double pumper.

CFM	Part Numbers	CFM	Part Numbers
262	R-4643-1AA-2BB2 (Holley 350)	595	R-3245+, R-3806+
340	R-7410++	600	R-1850, R-2818, R-4243 (4150-C)
370	R-7411++		R-4096+, 4557, 4776++-1, 6919-1,
375	R-4412AAS 2BB (50)		6609, 6619, 6979, 6989 7009, 6709+
390	R-6895+	610	R-4201, R-4202
450	R-4452	650	R-4777++, R-6708++
455	R-3220	675	R-4513+, R-4514+, R-4515+, R-4516+
487	R-6425AAA 2BBL (650)	700	R-4778++
550	R-1849	715	R-4647+, R-4345 (4150-C), 4279+, 4280
560	R-4295++ (4150-C)		(4150-C), R4118+ R-4168-, R4174+
570	R-3667-1, R-4360-2, R-4366 R-4440-1, 4584	725	R-3259-1+, R-4118+
		750	R-3300, R-3301, R-3977+, R-4779++
585	R-3139-1AAS, R-4210+(4150C)		R-4779-1++ R-6709++, R-6109+

Question: Torker Manifold Clearance

Question: Who manufactures the subtle hood scoop (which will be necessary with a manifold and Holley 650) as seen in TE/AE newsletter(Vol.10, No.6, 1985, page 5), the 007 car?

Answer: Even though we have all heard that "The stock air cleaner on a Holley double pumper with a Torker manifold will not fit under the stock hood", I have just this thing sitting in my garage and it works with no clearance problems. Dan Cameron has an Edelbrock F4B manifold with a 650 double pumper and the stock air cleaner under the hood, again with no clearance problems. In each case, we have done some things to help the problem: 1) The removal of the thick washer between the heat shield and the engine mount, and 2) the removal of the rubber seals glued tothe inside faces of the air cleaner.If a hood scoop is desired, some of the nicest are the aluminum hood scoops sold by Cobra Restorers in Kennesaw, GA. They are similar to the original Tiger scoop and fit well with the lines of the car.

Alpine Clutch Replacement

by Chris Laisi

I recently went through a clutch replacement on my '64 Alpine. I hope the information I found can be of some help to someone attempting to do the job. I have owned the car for eighteen years and have done all the maintenance, but this is the first time the clutch needed replacement. So here goes: During the years, I have had to rebuild both master and slave cylinders at least twice, so I elected to get new ones finally. The throw at the slave cylinder should be about 3/8"—if it is, the problem is inside. The car was rolled up on standard ramps, and the sequence of dismantling goes as follows:

ON TOP:

1. Disconnect carburetor linkage.
2. Disconnect top water hose from the radiator.
3. Remove carburetor.
4. Remove three top bolts between engine and bellhousing.
5. Remove floor covering and gear lever.

BELOW:

1. Remove drive shaft.
2. Remove the exhaust pipe.
3. Drain transmission (mine was empty).
4. Remove starter motor and slave cylinder.
5. Disconnect speedometer cable.
6. Place a hydraulic jack at the drain plug on trans and remove the eight bolts holding the rear engine mount.
7. Slowly let trans/engine down. At a point before engine hits fire wall, support rear of engine (I stacked a pile of 2"x6" pieces under the oil pan).
8. With the weight of the engine and trans being supported by the jack, remove remaining bolts on bellhousing.
9. Carefully slide trans back and down off engine.

Easy so far, right? After pressure plate removal, it is time to see what it needs. The throw out bearing was well worn and had a crack and the plate was also well worn, so those had to go. The pressure plate looked okay, back in she goes. The reason for no oil in transmission was a broken rear transmission seal, so I replaced both front and rear seals. The starter motor was also replaced. Back in everything went reversing the process, but to my dismay the clutch did not work. As much as I hated to, I had to go through the process again. This time I found a fulcrum ring in the old pressure plate had broken and had to be replaced.

Tips:

1) use new parts;
2) if replacing the master cylinder, use the old push rod as the new one may not fit;
3) the throw out bearing clips did not fit and had to be reamed out;
4) when using the clutch alignment tool, make sure it is centered when tightening pressure plate bolts. I think this is how I broke the fulcrum ring. Everything works great including the synchro gears with oil in the transmission.

Smooth Shifting Clutch Story

by Rich Bakula

My 1965 Tiger (Serial No. B9473202) developed an extreme case of chewed flywheel teeth. This was probably started about 12 years ago by a starter gear which was hanging up on the shaft.

When my mechanic (Gary Turner at GT Automotive) took everything apart, we also discovered that the clutch disc had just had it, after 16 years and 110,000 miles of service. You could see the wear indicator marks in the face, but you couldn't feel them!

The only thing we could tell about what we had was the flywheel part no. of C30E6380B with 159 teeth and a 10-1/2 inch clutch with no part numbers on either the disc or pressure plate.

Armed with Walt Tetrahedra's Tech Tip from the June 1981 issue of the TE/AE Newsletter and the S.T.O.A. Tech Tip, "Ford Muscle Parts Clutch," from April 1977, we decided to try for a Hays factory rebuild on the clutch, and blissfully called the machine shop in Orlando about a new ring gear.

Gary was able to contact the Hays factory in Cleveland, Ohio, to arrange for a rebuild. The person he talked to was Ray Van Dame at (216) 398-8300. Gary told Ray about the problem with the Hays clutch installed in a Tiger reported in Walt Teichgraber's Tech Tip, and Ray was surprised to hear this but said he would look into it.

Gary also asked for lighter springs, as we felt that what we had was 1,900-lb. springs (i.e., a Boss 302 unit). Gary measured all the critical dimensions, put a special identification mark on each piece and shipped it off to Cleveland.

What we got back was my original clutch (with our ID marks) all beautifully rebuilt! The invoice was for a "P/N" 40-107 Clutch Disc ($35.44) and "P/N" 41-200 Clutch Pressure Plate ($98.60). Gary said this was $35. less than a new Hays clutch, which probably wouldn't have worked, anyway.

The rebuilt clutch has a lighter touch, yet engages firmly. It has a different feel on disengagement, however, which eases pedal pressure at high RPM (much as described in the second paragraph of the above-cited S.T.O.A. TEch Tip).

Whatever was done to it seems like the right formula to me!

The flywheel proved to be a little more puzzling and difficult. The word came back from Orlando that the ring gear had to have either 157 or 162 teeth—not 159! Gary counted it three more times—159, 159 and 159. I called Tiger Tom who said to use a 162-tooth ring gear for replacement, but Gary and I felt uncomfortable with this solution. The machine shop finally found the proper ring gear at "Ford Special Parts" in California. I have no information beyond this. Perhaps someone will be able to fill in the details. We were invoiced for a P/N C202-6384B (This could be an erroneous translation of the Ford P/N C30E-6380B) ring gear at $49., plus $25. for labor.

Everything works perfectly, and I'm very pleased that we (Gary did it) were able to accomplish this project successfully on the first try, at a reasonable cost, while maintaining absolute originality.

By the way, Gary was able to do this work without removing or disturbing the engine or any of its components, probably in a similar fashion as was done by Walt Teichgraber and Scott Woerth.

THE TIGER FLYWHEEL (C3OE-6380B) IS NO LONGER AVAILABLE. C30E-6480B is the casting number of the flywheel used on the Tiger. The part number for this unit is C40Z-6375-A. It comes with the 160 tooth ring gear P/N C20Z-6384-A. You can use both the 10" clutch and a 10-1/2" clutch such as the LAT-60 on this flywheel.

SUGGESTION: If the part that you are looking for is no longer available under the original P.N, a good place to find a replacement part is in an interchange manual. The two most common interchange manuals are Mitchell's and Hollander's. If you can't find a copy at your local library, try your friendly neighborhood junk yard.

Big Bore Clutch Master Cylinder

by Jim Morrison

If you are having a problem with your Tiger's clutch not fully disengaging, one potential solution is the installation of a clutch master cylinder with a 0.750 inch bore to replace the stock unit (having a bore of 0.625 inches). This will provide greater movement of the clutch arm for the same pedal movement. As the volume of hydraulic fluid displaced (for the same pedal movement) is a function of the square of the bore diameter, the increase in bore will result in a 44% increase in clutch arm movement. But all this does not come without a trade off: clutch pedal effort is also increased by 44%. I have made this change to my car with good results, previously having had some trouble with a dragging clutch. The pedal effort is high but not unbearable (with a 2200 lb. performance pressure plate). The larger bore clutch master cylinder can be purchased through a Sunbeam parts supplier. Be sure to specify a bore size larger than 0.625". 0.700" and 0.750" are the next two popular sizes.

Tiger Shifter Removal

by Stu Brennan

OH #+%!;!! IT HAPPENED AGAIN !! I'm selling this piece of junk, shifter and all!! I had just pulled my Tiger's shift lever from first to neutral. The sound and feel were not normal, but they were all too familiar. The shift lever snapped into the neutral position but was not locked in the 3-4 side. The transmission was still in first. The Tiger had its front wheels against a curb. The sun was long gone, and I was without my usual tools or a light—or even one of Tom's coat hangers. After all, what can happen on a local trip, right? The only option was to push the car backwards with one foot (the other was on the clutch) slightly uphill and drive home in first. Along the way I decided that I wouldn't sell the car quite yet, but that worn and floppy shifter's days were numbered. A peek underneath convinced me that there should be room to remove the shifter without removing the transmission, so I started the search for replacements and removal information. This is where the fun started. The various experts I consulted had little to share. Several responded with versions of "I think I did it 10 years ago, and it was tricky; but I don't remember what I did." A member described various manipulations of the shifter body and its appendages which made me wonder if he wasn't really remembering something else he might have done in a Tiger back in his single days. And finally, one expert stated flatly that you can't remove it without cutting the tunnel—which he had done. Armed with this precise information I plunged ahead. I removed the shift lever, the three control rods and the three bolts that hold the body of the shifter to the transmission. But (after an hour of twisting, turning, pushing and prying) the shifter was still in the tunnel. Suddenly, while looking at the body of the shifter, the solution became obvious. Here is the process that I should have followed:

Preparation: A couple of days before starting this project, take a high pressure hose and blast the area around the shifter. Remove as much of the accumulated crud as possible. Let it dry or it will be dripping on you in step 3.

1. Remove the driver's side rug (passenger side for RHD folks). Remove the tunnel rug. The job is going to get messy soon.
2. Remove the shifter access door and the shift lever. You might want to be sure it's in neutral before removing the lever (to avoid confusion on reassembly).
3. From below, disconnect the three control rods at the transmission end only. Pulling the cotter pins seems to be the easiest way to do this. Discard the old cotter pins. They're cheap.
4. Remove the 3 bolts that secure the shifter to the transmission.
5. Here's the secret. You disassemble the shifter while it's still in the car.
   A. Take the snap ring off of the shifter's shaft. Hold the spring down with a screwdriver while removing the ring.
   B. Remove the two bolts on either side of the shaft and remove the control arm retainer.
   C. The three arms can now be removed with the rods still attached. You might want to label them to prevent later confusion.
6. Now turn the body of the shifter 180 degrees (as viewed from above) so that the shaft is now pointing toward the transmission. Push the shifter forward toward the area where the control rods where. It just falls out onto the floor.
7. Installation is just the opposite. Don't forget to perform the shifter adjustment procedure. Also, a touch of Loctite 242 (the blue stuff) on all of the bolts will keep them from vibrating out.

This procedure worked on my MKIA that was the fall of 1966. There may be car to car variations in clearances depending on who was swinging the sledgehammer when your car went through. I discovered an improvement on the cotter pin and spring washers used at either end of the control rods. Visit a Hurst retailer and find a Hurst shifter rebuild kit—the kit with the nylon bushings because it's cheaper (at about $5). Toss the bushings. The round clips—which install like hitch pins, but have a built in spring—replace both the spring washer and the cotter pin and are much easier to work with. It was mentioned a couple of issues back that Dan Williams of Franklin, NC (704-524-9085 noon to midnight) had a stock of Hurst shifters for Tigers. The Hurst "Indy" that I played with for a while was smaller and fit through the gap without any disassembly. I never did complete the installation of the Hurst because of other problems and ended up finding a replacement Ford shifter in good condition. Here's an interesting thought that I never followed through on. Would it be possible to drill the shifter's internals? All you would have to do is remove the shifter access door, pop your grease gun onto the fitting that you installed in the end of the shaft and give it a squirt. That should make it last longer.

Tiger Transmission Locks in Gear

author unknown

My 1965 Tiger MkI locks in gear, the shifter won't move. It usually happens in city traffic when shifting up and down several times. All at once it just locks up, but I believe it's almost always in 3rd gear. I usually just coast to a stop with clutch in or continue in third until the engine dies. If you just wait a while, jiggle it a lot, and oh yes, cuss a lot, it magically comes loose again until it happens again. I can not reproduce the lock up by trying, so I can't show it to a mechanic. Examination eventually located the culprit. The gate mechanism at bottom of shift lever.

This gate mechanism has slots that require a pin to be properly aligned (as determined by shift lever position) causing the selected lever to be actuated. This gate is what forces us to shift in the classic "H" pattern. However, we are sloppy shifters and shift like a "Z" when going from second to third. The end result is a worn and sloppy gate which allows the shift lever to actually try and select two gears or not completely disengage one gear before going into the next gear. Ok, so what's the fix.

Simple, sort of. Remove shifter. See other tech tips. Send to a repair specialist like Dan Williams in Franklin North Carolina. Or, disassemble yourself, repair the gates, replace the pin and install new bushings-most worn parts are available if ordered from local Ford dealers.

Problems With Hard Shifting

by Rich Bakula

I think Steve's problem may be very simple to solve. Based on his brief description, I suggest that he first try flushing and refilling the clutch hydraulic system—preferably with silicone brake fluid (lowest moisture absorption and highest operating temperature). Also, he should check that the clutch hydraulic line is routed well clear of the exhaust system and that it is free of kinks or crimps. My thought is that moisture in the clutch hydraulic system is boiling creating a situation of "soft pedal" (similar to fuel system vapor lock) with decreased clutch throw. The clutch is probably worn; but if it does not slip, grab or chatter when cold, this is probably a postponable problem.

Additional suggestions:

1. Change the transmission oil immediately and every 6000 miles until you have this problem solved. Look at the oil that comes out and have it tested for metal content if possible.
2. I would not recommend mixing lubricants such as trans oil and moly grease. Lubricant combinations can produce a congealed mass (like jello or putty) which inhibit lubrication.
3. Change the clutch only if (1) above does not improve the condition. If you change the clutch, be certain that the new unit will have the proper throwout distance.

See my Tech Tip in the July '82 issue of TE/AE Newsletter. I advise against adding A/C to any Tiger. Cooling system problems in Tigers are well documented, and adding another heat load is not a good idea. Extraordinary changes to the Tiger cooling system, while possible, decrease the originality and thus the resale value.

Five Speed Tigers

by Keith Bettencourt

Have you ever wished for one more gear in your Tiger? After you have pulled out onto the freeway, accelerated up to cruising speed, do you have to turn the radio up because you can't hear over the exhaust? Do you come home from trips tired and with your ears ringing? Would you like to cruise the freeways at 2000 RPM instead of 3200 RPM? Does a 20% increase in highway fuel economy interest you? Would you like to cut a second (or more) off your 0 to 60 time? If you answered yes to any of the foregoing, then you may be a candidate for a Mustang 5 speed transplant. The Mustang 5 speed, and its heavy duty cousin, the Ford Motorsport 5 speed are both adaptable to your Tiger. I've got one in mine and I have met two other guys (at SUNI) who had done it also. The difference between their transplants and mine is that they grafted in late model 6 bolt 302's with the Mustang 5 speed bellhousing, and I used an early model 5 bolt 289 (same bolt pattern as the Tiger 260) with a custom made bellhousing to transmission adapter.

If this idea appeals to you, here are the basics:

1. You will have to CUT your car at the body brace that is directly under the

ashtray. There is no way around this. The 5 speed shifter is integral with the transmission, and it comes through the center of the floor 4-1/4" further back than the stock hole. There is not enough room to move the engine forward or backward to avoid the "C" word. The cut is approximately 4" wide and 8" long and will weaken the body somewhat, but I have ridden in a Tiger with a 5 speed and a 450 HP, nitrous fed 302 that runs high 12's in the quarter, and it does not flex any more than any other Tiger I have ridden in.

2. A new transmission mount cross member will be required. The 5 speed transmission mount is 1-3/4" further forward and lower than stock so that no matter what you do to the stock mount, it just will not fit.
3. A transmission mount "wedge" will have to be fabricated because the 5 speed mount is angled about 5 degrees from horizontal when the transmission is vertically aligned on the bellhousing. You can't tip the transmission to compensate because there is not enough room (see #9 below).
4. Use the stock Tiger rubber transmission mount but rotate it 180 degrees and file one of the mounting holes a bit.
5. A short straight custom shifter is required because the Mustang unit is too tall, leans the wrong way and (even if reversed) ends up in the wrong place at the wrong time.
6. A new speedometer "driven" gear will be required. It will clip right onto your existing speedometer cable. Choose one that matches your choice of rear end gears and tires.
7. The driveshaft needs no modification. Slip it in and bolt it on.
8. The clutch needs no modification, the 5 speed input shaft is the same size and spline count as the Tiger unit.
9. The engine will have to be removed to perform this transplant. You need a lot of "wiggling room" to slide everything into place. The 5 speed is wider toward the rear of the transmission and that is exactly where it fits into the tunnel that is at the center of the frame x-member. I slid mine in from the bottom (with the radiator and front end removed) and that worked fine. I do not know how easy it would be to try this from the top, but my guess is the angles may make it difficult to impossible.
10. You will have to fabricate a new sheet metal tunnel cover for that 4"x8" hole in the floor.
11. A custom carpet piece will have to be made since your old 3" circular hole is now exposed, plus you now have a new floor contour around the shifter.
12. Kiss your console good-bye. You can use part of it if you remove the ashtray and cut about 4" off the back. It really is not too tough; but if you are new to mechanics, better get some help.

GEARING:

	A	B	C	D
1st	2.32	2.78	2.95	3.34
2nd	1.69	1.93	1.94	1.93
3rd	1.29	1.36	1.34	1.29
4th	1.00	1.00	1.00	1.00
5th	-	-	.63	.68

A-Tiger Close Ratio
B-Tiger II Wide Ratio
C- Motorsport 5 Speed
D-Mustang 5 Speed

As you can see, the Motorsport 5 speed has ratios that are very similar to the Tiger II transmission plus the addition of that lovely cruising gear! With a stock 2.88 rear end and either transmission you will get better dig out of the hole, eliminating the dreaded "Tiger Bog", plus you get the cruising gear. Even if you go all the way to a 4.56 rear end, your effective final ratio will only be 2.87. The Motorsport 5 speed is a good choice if you have a high horsepower engine or "big" gears. The Mustang 5 speed has the "lowest" first gear, so it's a good choice if you want to run the stock rear end or a radical cam because it gives better torque multiplication. You can also pick them up at a boneyard for about half the price of a new Motorsport unit. Such a deal!! I really cannot think of a single performance drawback with this swap, but you will have to decide if you want to cut your Tiger to have the benefits.

Manual Transmission

by Robert Kittredge

All Ford and Tiger books I've seen say to check the level and fill if necessary. One tech tip contributor writes that after 12,000 miles on his Tiger, it became difficult to get it into any gear before the engine warmed up. After noting that the transmission oil had never been changed, I suspected that the Ford Transmission Wizard had something in mind when he designed the drain plug. After I had it drained and refilled, the problem disappeared within a few days.

ADDITIONAL HINT: Since then, I have always said "Drain and refill" on my service order every 6,000 miles. A few years later my wife's Mustang (3-speed) started doing the same thing, and the mechanic swore he drained it like I asked. I explained my experience with my Tiger and demanded that he drain it now! The problem again went away.

Rebuilding the Tiger HEH-E Transmission with RUG-E Gears

by Robert Kittredge

I had read about using RUG-E gears on the early Tiger HEH-E main shaft in order to eliminate the "stumble "start when the HEH-E tranny was used with the lower rear-end ratios. This sounded like a good idea, especially when I located an RUG-E from a '67 Mustang. Preliminary inspection did not reveal any unacceptable abuse, so, as the price was right, I decided to try the trade. The primary reason for making the change of gears in the first place is that the Tiger HEH-E main shaft and hence, the tailshaft and tailpiece, are unique to the Tiger from the rear wall of the tranny backwards. The internal gears, though most are not interchangeable, do use the same roller, input and output bearings, blocking rings and gaskets. Any cooperative (don't mention Sunbeam Tiger until after he has ordered the parts) Ford parts man can get whatever parts that you are going to replace. It is easier to replace now while the tranny is down than after it has been reinstalled in the car. Disassembly and subsequent reassembly is extremely easy. The gearbox section of the Tiger workshop manual is an exact reprint of the Ford recommended procedure, and the current Petersen's Big Book of Auto Repair includes a step-by-

step section on the RUG-E. So pick a rainy afternoon (with everything at your finger tips, the time required is about 10 hours) and convert the area of your living room that is in front of the fireplace into a shop. I dreamt of intermingling gears, however; after cleaning and putting everything back together again, it seems to work. A few notes: Buy the best snap-ring pliers for headless snap-rings that you can. Start off by forgetting about the K-D or other cheaper types and go straight to Snap-On or Proto. Go ask the man who makes his living attacking trannys. Buy right the first time and save yourself money and cussin'. Follow the book. EXACTLY. Read it twice and do it once. Have your dummy shafts handy. For the cluster gear, a piece of 1/2" steel pipe about 8 1/2" long works beautifully. For the reverse idler system, I used a piece out of a Rain Jet sprinkler but any shaft about 3-3/4" long and a little less than 3/4" in diameter should work. You can't use the second set of shafts from the other tranny as they both are fitted with anti-rotation locks and are too long. The dummy shafts need to be a little shorter than the gear system. Assemble and place in the case the shift arms and then the main shaft before seating the rear bearing. It won't go in otherwise (it misses by a short 1/8"). Don't forget that the shift arms go through the case from the inside. It seems easier to locate the cluster gear and seat its shaft before putting in the main shaft assembly. Don't assemble the cluster with its roller bearings on the regular shaft. Check for end-play and then replace the shaft with the dummy and let the entire system down into the bottom of the case with a piece of wire. The bearings and thrust washers will all stay in place if you are careful. Assemble the input shaft, main input bearing and input to main shaft rollers and put this in place. Then raise the cluster and reassemble the shaft. The input gear/bearing assembly will not clear the cluster gears if it is in place. Ford parts numbers and list prices (create a company name and ask for a discount) as of 1/1/78:

Input shaft bearing	8D-7025	13.45
Main shaft output bearing	8D-7065	.09 ea
Reverse idler roller bearings (44)	CODZ-7121-A	.20 ea
Cluster gear roller bearings (44)	C4AZ-7121-A	.16 ea
Input shaft/Mainshaft rollers (15)	C3AZ-7118-A	1.75
Oil seal, Input shaft	B7AZ-7A283-B	5.00
Oil seal, Tailshaft	C4TZ-7052-A	.32 ea
Shift arm "O" rings (3)	1A-7288-A	.80
Rubber oil seal inside tailpiece	B9AP-7A011-A	1.55
Gasket set (3 gaskets)	C4AZ-7153-B	.05

Incidentally, a tip from a CAT member, the current Ford #C3DZ-17260-F ($13.20) is an identical speedo cable to the original and a 16 tooth gear #CODD-17271-A ($2.15) is also available. The OEM drive gear was a 15 tooth.

The Shifter Consultant

Having problems with your Ford shifter? Are you missing parts? Has your reverse lock-out broken? Then you need the "SHIFTER CONSULTANT". Bill Heely has been specializing in Ford Shifter parts long enough that he can answer just about any of your question. Bill repairs, rebuilds, and manufactures shifter arms, linkages, handles, etc. for the Sunbeam Tiger and other Ford marques. Drop him a note or give him a call at:

Bill Heely
3621 Mt. Olney Lane
Olney, Maryland 20832
(301) 774-6710

Another Shocking Story

by Dave Johnson

Finding shocks to fit the Tiger or Alpine is getting more difficult.

The original Armstrong Heavy Duty Shock had the following dimensions:

Extended Length ..... 12"
Collapsed Length ..... 8"
Top fitting ..... stud
Bottom fitting ..... 1 ½" ring with 3/8" bushing sleeve
No Dust Cover

There have been several shocks listed by other tech tips that can be modified to fit. I found that the Monroe GasMatic shock 5824 fits the specs with the exception that the sleeve is 2 1/4" long with a 7/16" bolt. Montgomery Wards had it in stock and on sale.

I tried cutting the sleeve but found that it was made of hardened steel. Even if I could cut it, I would still have to enlarge the hole in the mounting bracket from 7/16" to 3/8".

Using appropriate size sockets, and a vise, press the old sleeve out of the old shock. A 1 1/2 inch pipe 'T' fitting was just the right thing to press the old sleeve into. It held the bushing in place but allowed the sleeve to be pressed out.

Using the same sockets, vise, and pipe fitting, slowly press the new sleeve out of the new shock. I used silicone spray to lube the sleeve as I pressed. I would press forward about 1/2" and then release the pressure on the bushing. By looking into the pipe's hole you can watch your progress. Stop when the new sleeve is just starting in the new bushing (about 1/16"). Switch from the socket to the old sleeve and continue pressing the new sleeve out. It won't take long until you will have replaced the wrong size sleeve with the correct size old sleeve. Your shock is now ready to mount using the original bolts and bracket.

The trick is to use the old sleeve to push the new sleeve out. If you push the new sleeve out first, the hole in the bushing will collapse to about 1/4". You'll never get the old sleeve in the new bushing without tearing it.

FURTHER NOTE: If you have an emotional attachment to the original Armstrongs and don't want to remove the sleeve, most auto parts will carry a 7/16" by 1 1/2" sleeve. But you'll have to enlarge the mounting hole and use a 7/16" bolt.

Crossmember Crisis is Not That Common

by Jim Anderson

Tiger Tales, the newsletter of the California Association of Tiger Owners, carried a rather disturbing editorial, entitled "Time Bomb!". Written by Herb Mosley, the newsletter's technical editor, the article begins: "Every Tiger on the road with an unreinforced crossmember is a time bomb waiting to go off". Until this critical assembly is strengthened, your Tiger is at least as dangerous as the Pintos with the exploding gas tanks or the Buicks with the floppy engine mounts, if not more so". Mosley follows this dramatic warning with the explanation that the sheet metal assembly, although well engineered for the original purpose of holding up the front end of an Alpine at normal speeds, was weakened to accommodate the steering rack of the Tiger. The villain, says Mosley, is the constant flexing and vibrations which weakens the metal and the welds. "At some point, it will come apart". It seems that this has happened to one California member. He says the problem is preventable by having some weak points reinforced by a welder at a cost of about $50, once the assembly is out of the car. We checked with two of our East Coast technical experts, Tom Calvert and Bob Rhodes, and the sum total of their advice is that the situation is not quite as bad or dramatic as Mosley paints, although it does exist. Tom Calvert said, "In cars with sticky race tires, it is something that people should look for, especially if they autocross or race, and put more load on the assembly". "Typically, it's the cars with the stiffer springs and the fatter tires which have failures." Bob Rhodes, who has more than 200,000 miles on the current crossmember in his Tiger Mark II (complete with fat tires) and who has autocrossed with a great deal of success, says, "The assembly was over-engineered for the Alpine, which was good". If there is a weak point, says Bob, it would be at the shock towers and that could be reinforced by a weld that would not require removing the assembly. Just taking a wheel off would do. If a crossmember would go, the effect would depend on which part let go. The case reported by Mosley in California was able to steer to a safe stop.

Editor's Note: This article was reprinted to reflect a typical owner reaction to an article published in many marque newsletters which predicted doom, gloom and instant life threatening hazards caused by Tiger crossmembers. The truth lies somewhere in the middle.

Any vehicle 25+ years old should have its suspension integrity verified. It is true, Tiger crossmembers do experience stress cracks, sag and break at the shock towers. But it is not epidemic proportions. There is always a risk of mechanical failure in any vehicle which can be life threatening. The Tiger crossmember possesses a higher risk. Therefore, have its integrity verified by a competent Alpine/Tiger specialist. If an inspector is not aware of this problem then find one who is.

Upper Ball Joint Repair

by Burtis S. Horner

A potentially dangerous condition has come to my attention on two occasions. It is quite probable that this defect exists on other cars also. A thick steel ring into which the upper ball joints are pressed had broken away from the stamped steel portion of the upper A-arm. This ring is only spot-welded on originally. This ring should be

welded on as completely as possible, front and rear. This can be done on the car by freeing the upper ball joint from the stub axle carrier and pushing up as far as possible. Also, the flat wire upper ball joint retainer has been found to be missing on some cars. This can lead to the ball joint coming free of the control arms. This wire retainer can be replaced with a 175 outside snap ring which is much better.

Rear Sway Bars

Perhaps this has happened to you: You're at a local autocross, it's the last run, you have to make up .5 of a second to win your class, and finally beat the son-of-a-Z car that's been giving you trouble all season long. You are doing just great until you give a little too much power in a long sweeping turn and before you say, "Buddy, send your rice grinder back to Japan", your rear end is now where your front end was and you've knocked over 20 pylons. You ask yourself, "What can I do to correct this shameful act?" Well, you could sell your car, or just plain quit autocrossing, but if you're anything like me you can't buy either of those alternatives. You could continue in this shameful manner and plug your ears when they taunt, "Sunbeams never were meant to have a V-8 in them!" or "Take that thing to the dragstrip where it belongs!" But nooo... there must be something else to do. A good rear sway bar set-up is the answer. An Addco bar is as good as any. Right out of the box, if you follow all the instructions, your rear sway bar will really improve the car's handling. Unfortunately, it only works for a short period of time. The center rubber bushings will become stretched so badly that the bar will barely work at all. The bar's end mounting will also work itself loose. If you constantly want to crawl under the car and tighten up the sway bar bolts, it will continue to work okay. But if you really want to show that Z-car that your Tiger gets meaner with age, you will have to do a little work. The center rubber bushings must be changed to DELRON. This particular bushing will have to be a two piece bushing, in other words, it will be cut in half so it will fit over the bar. The best thing to do with the stock ADDCO end brackets is to take them in your hand...and drop them in the nearest garbage can. A new end bracket will have to be made. My end bracket is made out of 1/4" steel plate. It has a pivot and is adjustable.

The sway bar should be put on with the end arms facing the rear and the bar should remain level when installed. The bracket should also be bolted through the frame or welded to it. (Bolts with sway bar kit will pull through frame).

You will be glad you went through the extra trouble if you plan to install a rear sway bar. With the right amount of pedal pressure, your old Tiger should be able to slide through the corners with a slight over steer.

Autocross Check-Up: Be sure to check for loose nuts and bolts on leaf springs, traction bars, panhard rod, and sway bars. Check for stress cracks in frame in these areas: where traction bars weld to frame, where lower A-arm bolts to cross member and check cross member itself. Make sure front sway bar brackets are solidly in place. Check all lug nuts to make sure they're tight. Also check your motor mounts; no one wants their water pumped through their radiator.

Front End Ride Height Adjustment

by Jim Morrison

After rebuilding my front suspension, I installed a set of the CAT Club 335 pound competition front springs. The front end ride height was greatly increased from stock and looked funny, too. I decided to cut off the springs to lower the car by 55mm to my desired height (slightly lower than the stock height). Now the problem was "How much to cut off the springs?" I came up with two methods (one courtesy of Jim Burruss here in Huntsville and one of my own doing). Fortunately, they matched very closely. Here they are: Jim Burruss's way was to measure the distance between a point on the upper portion of the cross member and the A-arm at points directly forward of the center line of the spring (i.e. points that are the same distance from the lower A-arm pivot point as the center of the spring). This measurement is made at the ride height with the new springs installed (in my case this was 103mm) and again with the springs removed using a floor jack to adjust the ride height to the desired level (resulting in an 81mm measurement in my case). The actual points you use are not relevant, only the difference in the two measurements. Don't forget to have the spring insulators installed for these measurements. The difference in the two measurements was 22mm. This is the amount to lower the height of the springs. My method is a little more complicated. I measured the distance from the A-arm pivot to the center of the spring along the A-arm (185mm) and the distance from the A-arm pivot to the hub face (that the wheel fits against) which was 483mm. To calculate the amount to lower the spring height, I then multiplied the amount I wanted to lower the ride height (55mm) by the ratio of the two measurements above resulting in: 55mm X 483mm = 21mm. Both techniques assume that a change in the free standing spring height results in the same change in the compressed spring height. While not strictly true, the relationship is very close to linear for the relatively small changes needed. To mark the spring for cutting, set the spring vertically on a flat surface and measure the free height of the spring. Subtract from this the amount to lower the spring height calculated above, resulting in the desired spring height. Measure up from the bottom of the spring to the desired spring height. Find the point on the top of one of the coils that corresponds to this height and mark it. Now move up the spring one half coil (one half turn) higher than the mark. This is the point to cut the spring. A torch or band saw should do it (I took mine to a machine shop for this). While you are there, have them bend that last half coil on top down (bending at the desired spring height mark until the top end touches the coil below it) to provide a fairly flat surface for the top of the spring. Either procedure is not exacting, but I did get my ride height to within 4mm of my desired height. Some fine tuning can be done by using different spring insulators. One type (I believe this is the original style and is sold by the CAT Club) is approximately 0.6 inches high and fits on top of and outside of the coil. The other style is like that used on a 1974 Mustang II (Ford part number D4AA-5415-A). It is about 0.25 inches thick and fits on top of and inside the coil. Replacing the Mustang II unit with the CAT unit increased my ride height about 0.5 inches to compensate for some spring sag since installation. I have even heard of some Tiger owners using the spring insulators on the top and on the bottom of the springs. While not designed to be that way, I have not heard of any problems doing this.

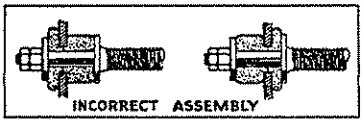
Panhard Rod Bracket Service Bulletin

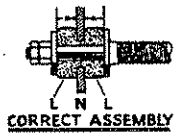
Factory Service Bulletin
SUSPENSION AND DAMPERS Sept. 1965
TO: ALL ROOTES GROUP DEALERS MODEL: SUNBEAM TIGER (260)
SUBJECT: PANHARD ROD BRACKET FAILURE

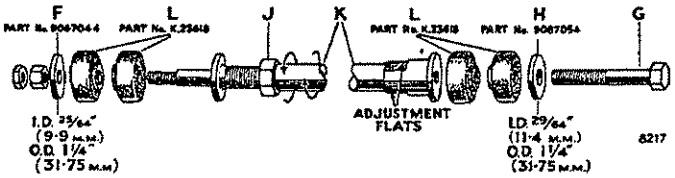
In order to minimize the possibility of Panhard Rod Bracket failure on the above model, all cars prior to Chassis Number B.9473544 should be checked at the next Service call to ensure that the correct washer, Part No. 9067044, is fitted at thechassis frame end of the Panhard Rod as shown on the attached illustration. Both locknuts 'M' should be removed together with the plain washer 'F'. The internal diameter of this washer 'F' should be 25/64" (9.9mm); if greater, the washer must be replaced with Part Number 9067044, and the old washer discarded. The new washer should be fitted, both locknuts retightened and the Panhard Rod adjusted as follows:

1. Load vehicle with 165 lbs. (75kgs.) in the boot, 20" (50cms.) rearwards of the centre line of the rear axle.
2. Slacken locknut 'J' and adjust Panhard Rod tube 'K' by turning it clockwise or anti-clockwise until the rubber bushes 'L' mounted on either side of the Panhard Rod bracket 'N' are of equal thickness, i.e., when there is no tension or compression in the rod, as shown.
3. Tighten Panhard rod lock nut 'J' and remove weights from vehicle.

Rootes Motors Inc., Kenneth Langridge, General Service Manager.







Tiger Extra Horsepower Caveats

by anonymous

QUESTION: Does the Tiger have any "weak" points which will come to light with increased horsepower? For example, I have heard that rear spring mountings are weak and will break under stress.

Answer: In preparing a Tiger for autocross or just for safety's sake for street use, the front cross member welds should be reinforced, particularly around the shock towers. The CAT shop notes do a very good job of outlining these points to be reinforced. The reinforcement of all welds on the suspension mounting points is a good idea. These can fatigue and fracture over the years. It is also a good idea to reinforce the frame cross member around and underneath the openings for the Tiger exhaust pipes by welding 5/32" thick plates to the three sides of the frame box. Cutout cardboard templates were required because it is a tricky geometry problem to get the plates the right shape.

Speaking on the Topic of Gears

by A. Wojtowicz

If you have considered changing the rear end gears in your Tiger for faster starts and more acceleration, you might be interested to know one of the other possibilities. The standard ratio Tiger rear is a tall 2.88:1. With 13" wheels this ratio gives a nice cruising speed with relatively low engine RPM. But there is a difference between the Mark I and Mark II transmissions. The Mark II Tiger came with a wide ratio transmission (2.78 first gear) that, for most driving conditions is the preferred unit. The close ratio (2.32 first gear) transmission found in stock Mark I Tigers is better for racing where a smaller "drop" in RPM between gears allows better use of engine power. As we all know, the 2.32 close ratio box (Mark I) with a tall 2.88 rear gear gives us a low speed start. To improve get away acceleration for street driving with the 2.32 transmission a good compromise rear end ratio is 3.73:1. Engine RPM at highway speed is considerably higher. Try driving around in 3rd gear all day, (yes all day) but acceleration is much improved. If you can tolerate the compromise you must make, then install a 3.73:1 rear end. However, before you pull the rear and start changing gears, let's look into it a little further. If the close ratio box is a 2.32 first gear and the rear end is a 2.88:1, the total gear multiplication in first gear, or the "break away" ratio is 2.32 x 2.88 which equals 6.68. If you changed the rear end to a 3.73 the break away ratio would increase to 8.65. For comparison sake, let's use 8.65 for our "ideal" compromise breakaway ratio. The wide ratio transmission offered in the Mark II Tiger has 2.78 first gear. 2.78 x 2.88 = 8.00 — much closer to the ideal ratio than 6.68. By changing to the wide ratio trans or trans gears instead of changing the rear, you will have, in effect, the equivalent of a 3.73 rear (the same first gear acceleration) without the high RPM at cruising speed. You can continue to enjoy the "economy" of a 2.88 rear end ratio. The spacing (%RPM drop) between gears in the wide ratio transmission is a little greater than the close ratio transmission, and the drop between third and fourth in the wide ratio transmission is 4% more than in the close ratio, but the 2.78 first gear is low enough to give great first gear starts. In looking for an ideal street/strip Tiger, I started out with a 3.73 posi traction unit +2.32 close ratio transmission. The car took off really well, but in fourth gear I wanted to shift one more time. I changed the rear end ratio to 3.07, because it was the closest ratio I could get to a 2.88 and still retain the posi-unit. At the same time, I installed a wide-ratio trans with the 2.78 first gear. 2.78 x 3.07 = 8.53 — very close to what I had before (8.65). The RPM difference between a 2.88 rear and a 3.07 rear at a given speed is about 6% (almost negligible). I am well satisfied with the combination of the 3.07 posi rear end with the wide ratio transmission.

A Warning About Silicone Brake Fluid

by Jim Morrison

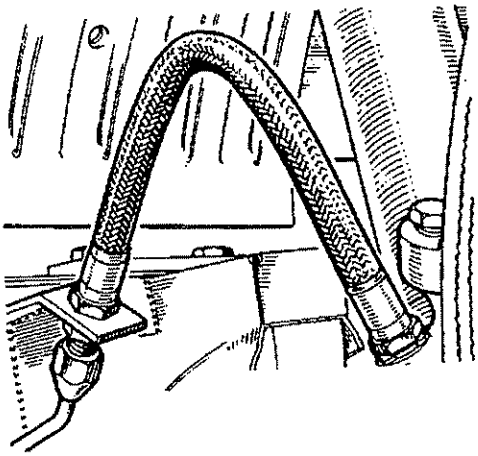
I am a firm believer in silicone brake and clutch fluid in Sunbeams. Unlike the Girling fluid, it is not hygroscopic (thereby keeping the inside of the master and slave cylinders from collecting water and corroding), and won't take the paint off your car even if you are a bit careless. But I discovered one drawback that could prove serious as it almost did in my case. When installing new stainless braided brake lines, I also switched over to silicone fluid. The brand I bought was purple in color (all silicone fluid seems to be colored—I have been told this is so you can tell when it is the silicone fluid coming out when you are initially bleeding the system; at the cost of silicone fluid, this may be the real reason).

After installation, I discovered a slow fluid leak from the left brake line at the new hose. Even though I tried a number of times to fix the leak, it continued to slowly drip. To make sure that I did not run out of fluid in the master cylinder reservoir, I checked its level frequently. This was easily done without removing the cap from the reservoir because the reservoir is translucent and the silicone fluid was purple. So all I had to do was glance at the level of the purple fluid. This technique proved potentially very dangerous. The silicone fluid had stained the reservoir purple and although the reservoir was almost empty, it appeared full from the outside. Fortunately, I found this out before I lost all my fluid and with it, my brakes. So the message is: always open up that reservoir to check the fluid level if you are using a colored fluid that can cause false readings from outside the reservoir. By the way, I finally was able to discover the source of my fluid leak. The seat on one of the new stainless hoses had cracked (probably from my over tightening it trying to make sure I would not have any leaks). It required a very close inspection to discover this crack as it was only barely visible to the naked eye. The hose with the cracked seat had a brass seat. I had a local hydraulic shop make up one to replace it that has a stainless seat and have not had any problems since.

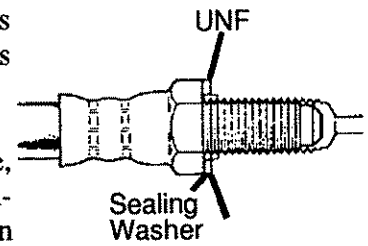
Flexible Brake Hoses

by Tom Ehrhart

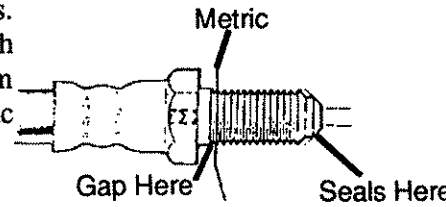
The following is taken from literature from Lockheed on the installation and maintenance of flexible brake hoses: To ensure that the vehicle braking system remains in good working order and provides the essential safety and reliability, periodic checks and replacement of flexible brake hoses is necessary. At every 6,000 miles, 10,000 kilometers, or 6 months (routine service period), check hoses for chafing, cuts, perishing and security of end fittings. If any defects are found relevant hose(s) must be replaced. Take care when fitting replacement hoses to ensure that they are not twisted or kinked, and are clear of any part of the vehicle liable to cause chafing.



It is easy to see the pattern moulded into the hose rubber. It must be running perfectly straight, any twisting during fitting could put a permanent torsional load at the end connections which can result in premature hose failure. Tighten hose fittings sufficient to prevent leakage, but do not over tighten. It is important to note that hoses with UNF threads use a copper sealing washer, as illustrated.



METRIC hoses identified by an "M "marking, seal on the tapered end and, therefore, there will be a gap between the hexagon and the face of hydraulic unit. Recommended tightening torques: Cases have been reported where damage has been caused to certain hydraulic assemblies by over tightening brake hose connections. Great care must, also, be taken not to over tighten other associated components such as tube nuts, banjo bolts, bleed screws, etc. Therefore for guidance, maximum recommended torque figures are listed below for both Unified (UNF) and Metric threads.



Unified Threads

	Lb/in	Nm
Bleed screws 1/4"	50	5.63
Bleed screws 3/8"	100	11.33
Int. & Ext. tube nuts 3/8"	115	13.03
Hose fittings 3/8"	120	13.53
Banjo bolts 3/8"	170	19.27
Bleeder screws 7/16"	170	19.27
Int. tube nuts 7/16"	140	15.8

Certain METRIC threads are similar in size to UNF threads, therefore, it is important that they are correctly identified. If any doubt exists, do not use a spanner, but first screw the component fully home by hand. If the fitting is tight or unduly "sloppy" check the thread type. Such parts as tube nuts, bleed screws and hose end fittings, etc., with METRIC threads are colored pale gold, similar parts with UNF threads are colored silver, green, or red. It is recommended that all flexible brake hoses are renewed at least every 36,000 miles, 60,000 kilometers or 3 years, whichever occurs first.

Brake Fluids

by Stu Brennan

I remember sitting in a tech session at a United several years back, listening to some of our experts talk about silicone brake fluid. They were describing how easy it was to put silicone fluid in— just fill the reservoir and bleed until the silicone fluid came out. I pointed out that there would still be a bit of old fluid left in the wheel cylinders and calipers, but no one thought that this would be a problem. A recent answer to a technical question in ROAD & TRACK suggests that this is not the case. They state that if silicone (DOT 5) and glycol (DOT 3) fluids are mixed, the glycol will cause the rubber swelling additives to separate from the silicone fluid, and the silicone will cause the anti-corrosion additives to separate from the glycol. So, it seems that the best way to change to silicone is to start with a completely dry system. The article also contains some interesting comments about the various types of rubber used in brake systems and how each fluid works with them. See pages 199-200 of the November, 1989, issue.

Special Notice - RE: Silicone Brake Fluid

It has come to our notice that some users of Silicone Brake Fluid have experienced problems with strange-feeling pedal. Since silicone brake fluid exceeds DOT-5 standards, there can be no possibility that the fluid is doing strange things when in use! The problem seems to stem from the fact that silicone brake fluid retains air bubbles more stubbornly than regular brake fluid. Therefore, some special precautions are needed when filling and bleeding systems with silicone brake fluid: When filling; Do not shake the can of fluid before opening. Pour very slowly with minimum agitation of the fluid. After filling, allow to settle for 10 minutes before bleeding. Preferably, use a power bleeder. If none is available, depress the pedal with slow, careful strokes, rather than a violent pumping action. Continue until firm pedal is obtained, making sure that you keep the reservoir topped up slowly and gently. With these precautions followed, you should be able to get an air-free system which will give you years of perfect operation.

Series V Alpine Brakes

by Steve Finberg

On a recent trip to my favorite parts emporium, I was told they were no longer stocking brake shoes for my Series V Alpine; but if I would leave a $10 deposit, they would be glad to special order the part. Somewhat of a bummer, however the long put off brake job would wait another week. On the following Saturday I was told the parts were only available through Lucas. As my parts store was not dealing with Lucas for anything excepting electricals (seems Lucas is getting a bit unfriendly), the parts were deemed "unavailable". To make a long story short, I then asked for shoes to fit a 1973 four cylinder Capri. It seems the '71 thru '74 Capri used the same Girling brakes. Not only were the brakes in stock but on sale for about 1/3 the price of the Sunbeam replacement part. Be careful to get shoes for the 4 cylinder Capri as the 6 cylinder used a similar but wider shoe. In addition the associated hardware for the Capri brakes also fits the Alpine. The return springs (Gibson P/N 10325-2) are identical. While the hold down springs (Gibson P/N 14016-2) are slightly larger, they fit fine.

Brake and Clutch Hydraulic Cylinders

by R. Pennell

The hydraulic cylinders were all rebuilt with painstaking care and utmost cleanliness. All internal parts were soaked in Castrol LMA and the completed assemblies stored in air tight ziplock plastic bags. All of this work was completed approx. 1-1/2 to two years prior to installation on the car.

Lo and behold, with everything assembled on the car, neither the brakes nor the clutch would work. So, off came all of the hydraulic cylinders for inspection. Incredibly, the internal parts were more corroded at this point than before they were originally cleaned up and rebuilt.

They have now been rebuilt for a second time, but this time the hydraulic system is filled with Dow-Corning silicone fluid, and everything seems to be working just fine. The conclusions reached from my experience are:

1) The cylinders should not be rebuilt until close to the time they will actually be installed, and
2) To be on the safe side, spend a few more bucks and go first class with the silicone fluid.

Cylinder Liners

from CAT

In January, 1984, we published an article on a brake cylinder lining service offered by White Post Restorations. By popular demand, we are republishing their address, as follows:

White Post Restorations
White Post, Virginia 22663
(703) 837-1140

White Post prefers that you strip your battered cylinder (brake or clutch) of all parts, then send it to them via courier. Using special boring bars and jigs, they will hone/bore the cylinder oversize, then fit a seamless brass sleeve into the cylinder. Finally, they polish the brass back to standard size and return it to you, usually the following day.

The prices we have may be obsolete, but they are: US $28. per sleeve for calipers and wheel cylinders; and US $42. per sleeve for master and slave cylinders. There's a 50% charge for stepped sleeves, plus courier charges both ways.

Brake Component Thread Repair

from CAT

The threads on most of the components of your Tiger's brake system are fragile at best. It is easy to cross-thread a line into a cylinder, for example, and, once the threads are damaged, the chances for a good, leak-free connection are very small unless you can repair the threads.

One thing I do before refitting any of the brake (or clutch) lines is carefully run a 3/8-24 bottoming tap into the cylinder and run a 3/8-24 die over the fittings on the line to clean out and renew the threads.

Master Cylinder Cleanup

by Jim Morrison

In attempting to return the engine compartment in my Tiger to like new condition, I found no way of cleanng the exterior of the clutch and brake master cylinders to remove the discolorations of age. As a last resort, I lightly sand blasted them with very good results. The first step is to thoroughly clean the part of grease, brake fluid,

etc. Then tape up or plug the openings to prevent the sandblasting from damaging the bore. After a light sandblasting, remove the tape and plugs and clean the piece thoroughly with soap and water making sure to get any sand particles out of the passages. Blow it out with an air gun and let it dry. Further protection and beauty is added by coating the piece in a clear coating. For longest lasting results,use a coating that does not dissolve in gasoline or brake fluid. I found a spray can of Rustoleum clear to work very nicely, but I would suggest you test a few brands before trying it on the real thing. The end result is an attractive alloy finish with its glossiness determined by the type of clear coat used.

Silicone Brake Fluid to the Rescue

by T. T. Cantwin

Remember, a major enemy of our hydraulic brake and clutch systems is moisture. The famed Castrol LMA (low moisture absorption), brake fluid is the next best thing to a sponge. Despite its LMA rating, it does in fact absorb moisture when exposed to the atmosphere through the reservoir vent holes. The best that can be said about this great juice is that it does in fact keep the rubber seals from swelling. Silicone brake fluid, on the other hand, is virtually impervious to moisture and it too will not deteriorate our rubber seals. It costs about twice as much for twice as much protection. Not a bad deal for a brake system that will last about as close to forever as you'll get. A three-year test of Dow Corning's silicone brake fluid demonstrated its ability to prevent corrosion of major brake components. Northern States Power Co. tested the fluid in fifteen vehicles that traveled a total of 311,300 miles. None required replacement of wheel cylinders, master cylinders, or calipers because of corrosion.

Servo Unit Rebuild Instructions

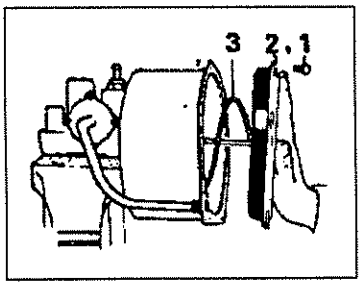


Figure 1

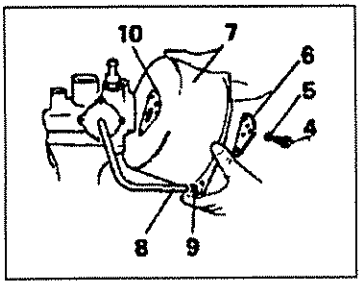


Figure 2

by Tom Ehrhart

Rebuilding of the Girling servo is a critical operation that requires cleanliness, care in disassembly/reassembly, and moderate mechanical dexterity. If you are a little weak in or doubtful about the latter, get a qualified individual to help or do not attempt this rebuild. If you are apprehensive about attempting this rebuild—don't!! The worst that can happen is the brake fluid will leak out causing the brakes to fail, or the brakes will lock up making the vehicle immobile, or the brakes will fail to release completely causing severe brake pad rotor and shoe/drum damage, or (finally) no brakes at all—YOU guess what happens next! Now that you have been appropriately put on guard or scared, let's start... Removal of the unit from the

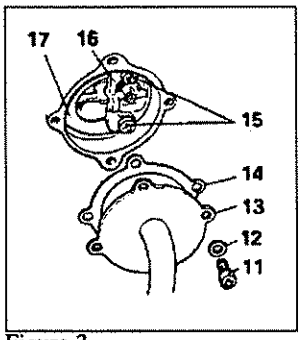


Figure 3

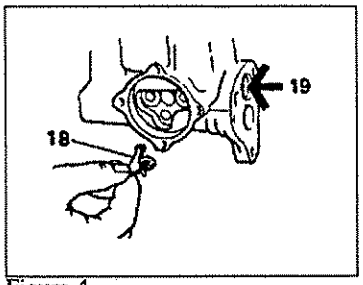


Figure 4

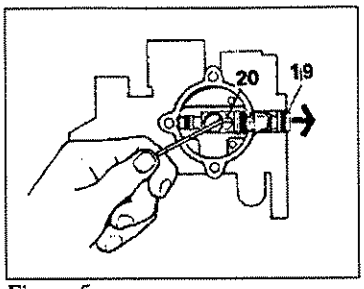


Figure 5

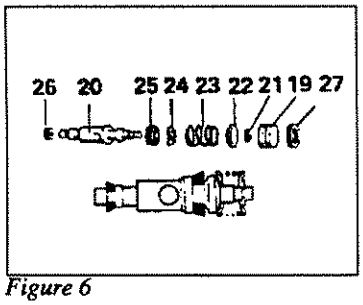


Figure 6

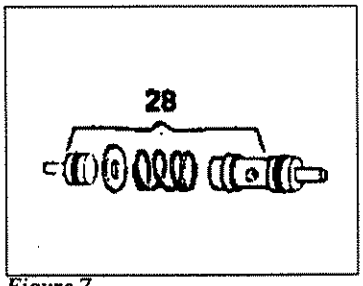


Figure 7

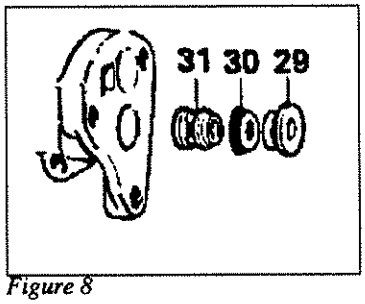


Figure 8

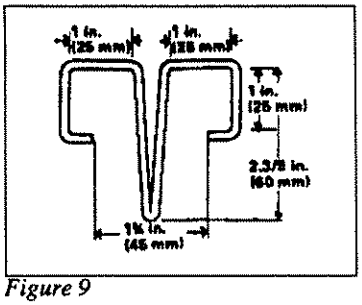


Figure 9

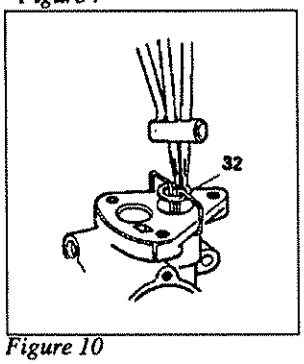


Figure 10

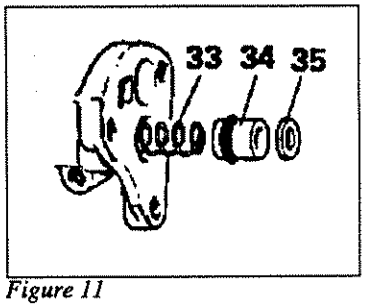


Figure 11

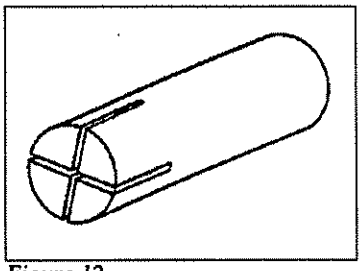


Figure 12

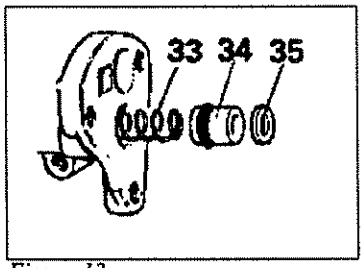


Figure 13

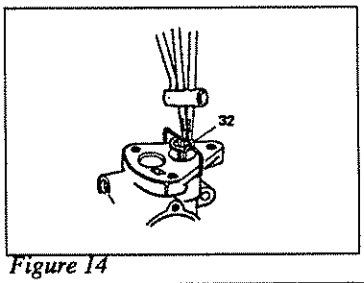


Figure 14

car is made easier by first removing the manifold vacuum line banjo fitting and the small air filter element on top of the unit. This provides more room to get a 7/16" wrench on the input and output lines. Remove the lines before removal of servo from mounting brackets. Follow Figures 1 through 11 for disassembly (dismantling) instructions. With unit cleaned, examine all bores for corrosion, pitting, scoring, or ridges. Using a flashlight is one of the best ways to examine the bores. At this point of your examination, you are bound to find the bores in need of service. Pitting is almost always a result of moisture buildup within the fluid and is usually quite severe with servos that have not been used for extended periods of time (a year or more). Scoring and ridges are a result of piston scrubbing from use. In all cases, these bore conditions must be rectified. You are wasting your time and possibly

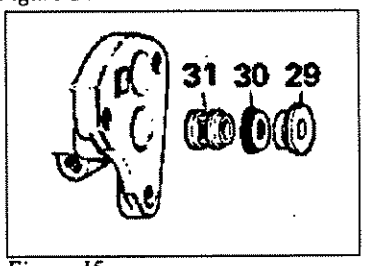


Figure 15

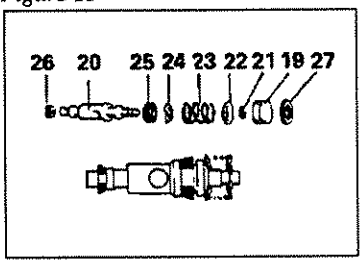
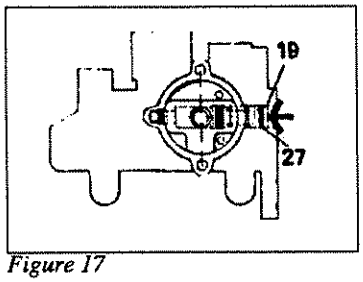


Figure 16



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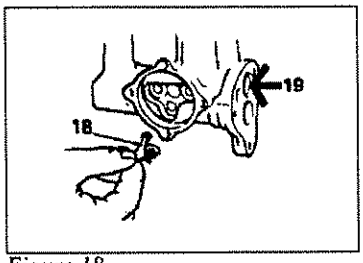

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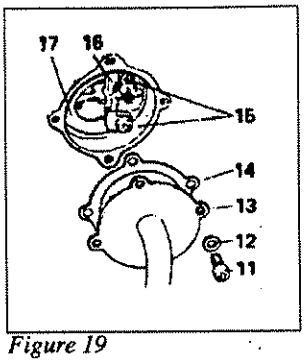


Figure 19

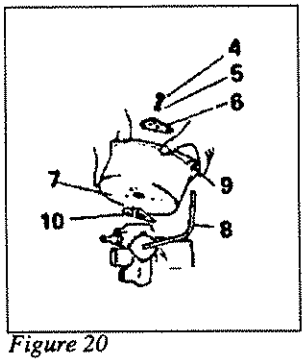


Figure 20

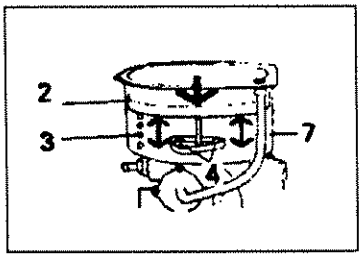


Figure 21

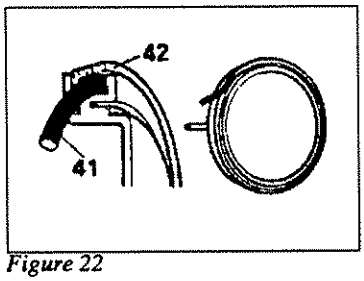


Figure 22

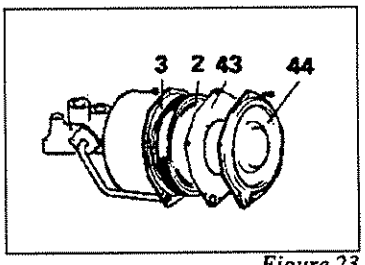


Figure 23

your life if you do not restore the bores. This is the main secret of a successful servo rebuild. Despite appearances, most bores are repairable by honing. There are three (3) bore sizes in your servo, they are as follows: Vacuum Upper Bores, Lower Bore Canister ID, Small (5") 3/4", 5/8", 7/16", 3/4", Large (7") 3/4", 5/8", 3/8", 3/4". When determining booster size, check diameter of rear cover. Small is approx. 6" and large is approx. 7-1/2" Commercially available hones are usually available for the 3/4" bores, but you will have great difficulty finding hones for the smaller bores. It is easy to make your own hones, though. With a brass rod as shown in Figure 12 (liberally coated with fine grit valve lappng compound), insert in bore and rotate back and forth/in and out until ridges and pits are eliminated. In the absence of honing, #400 wet/dry sandpaper wrapped around a rod can sometimes be used to remove bore imperfections. Then, with #0000 steel wool wrapped around a rod inserted in a high speed drill, polish bores to a mirror finish. Again using a flashlight, look down the bores to verify your handy work. At this point, if all bores are satisfactory, clean one more time with a strong detergent and hot water. Remember, if you would not eat off of it, it is not clean enough! Now precoat all hydraulic parts with synthetic silicone brake fluid and assemble unit as shown in Figures 13 through 18. Next, prepare vacuum cylinder piston for reassembly. Using #400 wet/dry sandpaper, polish cylinder bore. With the rubber strip removed from behind the leather seal, wrap a dry rag around the leather seal overnight to absorb brake fluid. Do not use solvents to do this job. Thoroughly saturate the leather seal with a silicone lubricant (usually in spray cans) or use lubricant supplied with the rebuild kit. Coat the cylinder bore with the same lubricant. Continue assembling as shown in Fig. 19 through 23. Just prior to replacing the cover plate, fully depress piston several times. The piston must be pushed completely out of the bore by the return spring (Fig. 21 Item 3) without sticking. If it does stick, remedy the problem by adding lubricant on leather seal and/or using a razor blade to cut the foam seal (Fig. 22 Item 41) in half lengthwise.

NOTE: If the piston sticks, your brakes will lock up or not completely release causing severe brake rotor and caliper damage. It is highly recommended that you use a synthetic (silicone) brake fluid in your new rebuild and the rest of your brake/clutch system.

Brake Pointers

These pointers were written with the new owner in mind. Purchase of a shop manual is highly recommended.

a. Fluid color - you want clear fluid, not dark. Dark fluid indicates deterioration of the rubber seals. Drain and refill with Girling or Lockheed fluid only. Standard fluid will deteriorate the seals (and may have caused the problem in the first place).

b. Fluid loss
   1. If your car blows white smoke out the exhaust pipe, the power brake servo may need to be rebuilt.
   2. If driver's side of firewall behind brake pedal is wet and/or you must pump up the brakes, rebuild master cylinder (A quick and easy job).
   3. Rear brakes need adjustment from time to time. When rear brakes need adjustment, the parking brake will also need to be adjusted.

Giving Your Disc Brakes a New, Quieter Tune

by Tom Ehrhart

The melody of squealing disc brakes has been with us since Day One. The tune need not be an annoying and frustrating one, however. In fact, it need not be one at all. Our cars have always had certain engineering features which eliminated these embarrassing, gad-awful sounds. Some cars, most notably the sedans, had special caliper pistons with a contact area leaning 10 degrees See Figure 1). Alpines and Tigers utilize the same principle, but accomplish it in a different way. They use a shim. (See figure 2). Unfortunately, most shims have been discarded with Father Time. Since figure 2 is drawn actual size, it may be used to make your own. A suggestion for material is any sheet metal similar to factory shims, which were made from cheap sheet metal about 0.017" thick. Be sure to face the arrow in the direction of wheel rotation while traveling forward.

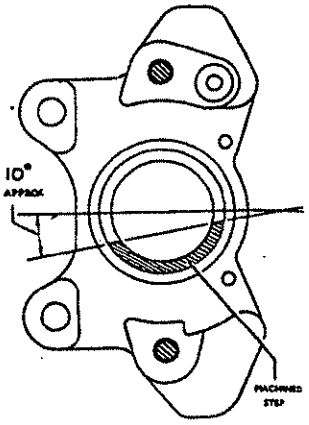


Figure 1

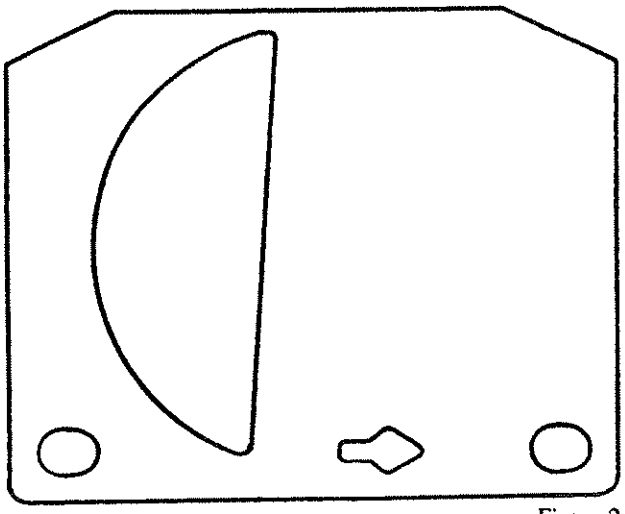


Figure 2

Servo Survival

by Phil Lindsay

The vacuum-power brake servo unit is really a two-sided beast. Its good side provides substantial braking assistance to romping Tigers and, thus, it seems to be desirable for most Tiger owners. I've only heard of a couple Godzillas who don't need the servo. The bad side of the servo can really be nasty, like engine vacuum leaks (air to vacuum chamber leaks), loss of hydraulic pressure (internal fluid leakage in piston seals) or loss of hydraulic fluid (fluid goes into engine intake due to vacuum seal leakage). Rebuilding the servo requires more effort than the brake cylinders, but the extra effort is offset by the cost of a new servo ($150). The rebuilding effort should go well if your brake system has been cared for during the servo's life. I think that the most important factor is periodic changing of the brake fluid. I don't mean topping off the reservoir every year. You've got to completely purge out the old fluid. Start by emptying the master cylinder reservoir with a squeeze bulb and wipe out all of the dirt with a clean cloth. After refilling with fresh fluid (half-opened cans of unused fluid are not considered fresh if there has been moisture contamination), start bleeding each brake in the usual manner. Continue to pump at each brake until clean fluid comes out; don't forget to replenish the master cylinder reservoir. This entire procedure will require at least two pints of fluid. No, it's not a waste because the old fluid will corrode the internal parts of the servo, as well as other brake parts, and make rebuilding very difficult, maybe even impossible. The frequency of fluid changes probably depends more upon time than mileage: I suspect every 12 to 18 months is reasonable. If your brake system has been well cared for, you will find the internal bores in the servo to be clean and smooth. If so, you can forget about honing the bores and concentrate on a very thorough cleaning before rebuilding. The subject of bore honing is very controversial, especially for hydraulic systems built of aluminum such as the Girling units. If a cylinder bore is damaged due to corrosion attack or mechanical scratches, it must be smoothed out in order for the rubber seals to work without excessive wear. If the bore is bad, throw the unit out and try again! (Or, maybe get super machinist Tom Hall to make up a stainless steel sleeve.) There are several approaches to honing and all of them have problems. Aluminum is soft and difficult to smooth out; the servo bores have small diameters which are difficult to hone and it's difficult to thoroughly clean out the cylinders after honing. All in all, it's a nightmare. If you can retain the bore concentricity while honing with a sandpaper-covered stick or a miniature honing stone, you will have beat the odds. Good Luck! My point of this doomsday story is simple: Don't hone a good bore! There is nothing harmful about the so-called "glazed surface" on aluminum; feel it—it's smooth! There have been numerous tips on servo rebuilding, including the instructions provided with the rebuild kit. The kit directions are pretty good, but I've found a few modifications which have helped me.

1) Good circlip pliers are necessary for removal of the output piston circlip. It's a tight fit because the circlip is buried deep down the bore. I had to extend the tips on my pliers in order to fit.
2) The spring tool for holding down the output piston while removing the circlip is worthless! It takes up space within the bore and interferes with the circlip pliers. It also prevents the piston spring from helping guide out the circlip.
3) The new rubber strip which fits under the leather seal on the vacuum piston

often is too large, causing the piston to bind and lock up the brakes. A great anti-theft feature, but not so convenient! Reuse the old seal if not damaged; otherwise carefully cut the new strip on one side so as to reduce its thickness.

4) The leather seal and rubber strip will be saturated with brake fluid. Use clean paper towels or rags to blot up the excess fluid; keeping in contact with the strip for several hours will help.
5) Silicone spray the leather and allow to soak into the seal. Be sure to use silicone (WD-40 is not silicone.) Allow silicone to soak in for a couple of hours and wipe off excess.
6) I use the "special servo grease" provided in the rebuild kit. Work it into the leather and coat the rubber strip. Also, wipe a thin coating over the vacuum cylinder bore. Rebuilding servos, master cylinders, etc. are big pains! Change your brake (and clutch!) fluid more often for less pain! Tiger and Alpine owners over time have experienced a variety of maladies centered around "stopping the beast", i.e. brakes.

Contrary to common belief, the brakes on a Tiger are basically the same as those on an Alpine. (Keep in mind that there are two body series for Tiger and Alpine; Series IV and Series V and Tigers came as MK I and MK II.) It is reasonably safe to say that at this time there are fewer than 5 percent of all Tigers and Alpines with their brakes in the best condition possible. Why so few? Several reasons: there are a number of brake service procedures that are required but almost never followed as most owners do not own service manuals or owners manuals which are needed for the necessary information. There are three items that are most often overlooked.

#1 - Brake fluid is hygroscopic; it absorbs water from the atmosphere and becomes contaminated resulting in internal corrosion (oxidizing) of all components. Reduced braking power, and rapid brake fade under moderate use. The factory service procedure is to completely replace the fluid at one year intervals. Start with the engine off, depress the brake pedal 3 - 5 times before bleeding to eliminate all vacuum in the booster. Bleed the rear (left wheel cylinder), first, then the left front, then the right front. Be sure to use only Girling amber or Castrol LMA (low moisture absorption).

#2 - To properly bleed the rear brakes, they must be adjusted out until the wheels will not turn by hand; this ensures the removal of all air that may be trapped in the cylinders. Brake pedal height is also determined by proper adjustment of the rear brakes, usually two clicks back from hard lock.

#3 - The brake servo air filter should be replaced every 6000 miles. Dirt in this filter or a blocked filter will result in a hard pedal or apparent lack of servo assist.

It should be noted that a Tiger or Alpine with brakes in proper condition can lock up all fours at 15-20 mph testing speed with standard 78-70 series tires and stock pads. For vehicles used in competition (auto-cross; short to medium length tracks) standard pads and shoes are fair, however, improved times may be had by using up-rated components. As one additional point of interest, I recommend that each of the bleed screws be loosened and retightened at least once each 6 months and that they not be overtightened (5lb. ft.). Also, when servicing the rear brakes, the

brake adjusters should be disassembled, cleaned, coated with never-seize compound and reassembled. This does not apply to those later 1967 production Tigers and Alpines equipped with self adjusting rear wheel cylinders. These should be checked at 6-month intervals for freedom of operation. Still on brakes and in answer to a question from a fellow member, the blue-white smoke and heavy detonation or engine knock experienced after heavy braking is the result of brake fluid entering the engine through the servo to engine vacuum hose. This results from a failure of the servo piston rod bearing bush seal which forces fluid into the vacuum cylinder. If the failure has not occurred here, it has occurred at valve control piston -either at the hi or lo pressure end which will allow fluid to enter the valve chest. In any event, the servo must be rebuilt. Sunbeams from B9470001 thru B382991282 have small-chamber boosters which use Girling kit SP 2230; from B382001283 have large-chamber boosters which use SP2228. If a new servo is needed due to scoring of a piston, #64049127 is for the small chamber, and #64049460 is for the large chamber. These numbers also apply to Alpine Series IV small and Series V large. To close this rap on brakes, let me say that the limiting factor on proper brakes in a Tiger or Alpine is tires, particularly on the Tiger. One can very easily overpower these tires with standard brakes. I'd suggest ...well a lot of things, but for starters minimum size should be about 175/70-13 and not any smaller. The upper limits are determined by rim size and room in the wheel well - LAT9 & 70 wheels and T.A. 60's (BFG) work nicely.

...And it Worked for Me!

by Ron Rogers

I am about to divulge a secret that has been invaluable for making my car win races for the last six years. Are you ready for this one? I know that I have maximum braking power. This fact not only helps the car perform better, but also helps me be a little more daring on those "deep corners." No matter how much work you've done on your brake system, I'll explain why you're not developing full potential and more importantly, how you can. In the beginning, all Sunbeams were created equal. That is, equal tires front and rear. Same width, same height and same compound. They were also calibrated by the factory to stop with the front wheels locking up before the rear wheels. This is important because it prevents your rear end from passing you in a hard brake situation. So what's the problem? Unless your car has original tires (and even if they do) you can probably lock your front wheels long before your rears, if at all. What this all means is that your brake system is not fully balanced for maximum braking. If you have different size tires front and rear and/or different widths; traction bars to prevent spring wrap-up under hard braking; altered ride height in any way—lowered sagged springs, raised to clear tires; or altered weight distribution front/rear; you really are asking for it. But wait! No need to send your car to Ralph Nader and take the bus. A simple and extremely effective solution is at hand. All we want to do is shift more of the braking load to the rear wheels. Other than changing lining, compound and/or sizes, the most effective solution is an adjustable brake proportioning valve. The best one that I know of is made by Kelsey-Hayes and sold through Ford and Chevy dealers. The Ford part number is C5ZZ 2B091 B and the Chevy number is 3878944. The valve will have to be installed on the brake line that you want to reduce pressure on; that is, the front brake line. To install the proportional valve you will need the valve,

a three-way tee block, three or four compression fitting connectors, five double flare ends and fittings, one brass plug, and three or four feet of steel brake line. I'll leave the placement of the valve and tee block up to you, but you must put the parts on in the correct way. Remove the line from the servo to factory 4-way tee. You will have to cut the ends off this line about four to eight inches from the fittings. The three way tee and valve must be installed between the servo and factory four way tee. The rear brake line must be removed from the factory four way tee, the hole plugged and the line connected to the remaining hole in the three way tee. Here's how it looks: Now comes the good part—set up. First, bleed the front brakes to remove air from the valve. Really stand hard on the brake to make sure there are no leaks anywhere. Then, go to an empty parking lot with wrenches for adjusting the valve, a roll of masking tape, and a friend. Place a strip of tape every 90 degrees on the side walls of the front and rear tire on one side of the car. With the valve in the "full in" position, start doing panic stops from about 20 to 30 mph while your friend watches the tires. He'll have no trouble telling which wheel is locking up first. Gradually back out on the adjuster until the rears lock first; then back in slowly until the fronts lock up, just before the rears. Tighten the lock and you're home. When you can see exactly what your brakes are doing, there is no doubt on how they're working. If you change your tires or brake linings or suspension, no problem; re-adjust! You'll know you're at maximum. It worked for me.

Tire Selection

by Steve Hansen

Now that our Alpines and Tigers are between twenty-five and thirty years old, they are probably not riding on their original 6. 00 X 13 Dunlops any longer. Still, for those who may be interested in upgrading their Sunbeam's shoes, a short primer on some of the considerations involved may be in order.

The original tires on our Alpines and Tigers were the state -of- the-art for their day: Built with the latest nylon or rayon cord construction, they had an aspect ratio of 80, that is the tire's sidewall height was 80% of its width. Later advances in tire technology brought the so- called "wide oval" bias ply tire (for example "A78 -13"), with an indicated aspect ratio of 78%, and the first- generation radial ply tires, which introduced us to metric tire width designations (for example "165SR13", where 165 refers to the tire width in millimeters - in this case, just under 6 1/2". The "S" designation refers to the tire's maximum speed rating, in this case 112 -MPH. "R" is just shorthand for "radial").

More recent developments have included the introduction of tires with lower and lower aspect ratios- such as the "70- series" tire (185/70SR13, for example) and the still wider and lower "60- series" (205/60HR13). Careful readers will have noted the "H" speed rating of this last example, indicating a safe maximum speed of 130-MPH.

All of the tire sizes I've listed can be successfully substituted for the Sunbeam's original 6.00x13 rubber provided that wheels of the correct width and offset are used. Wheel width should be obvious, however the term "offset" refers to the distance between the wheel's center line and the mating surface where it contacts the hub. Further, offset can either be positive (wheel center line inboard of mating surface) or negative (outboard of mating surface). Standard Alpine and Tiger steel wheels have a positive offset of 1 1/8". It's important that this original offset be matched or closely approximated when replacement wheels are fitted, otherwise wheel bearing life and static wheel balance can be negatively affected.

Another recent trend in tire/wheel upgrading is the "plus" concept, in which the original wheel diameter is increased by one or two inches (so -called "plus one" or "plus two"). This enables the use of lower aspect ratio tires while approximating the overall diameter of the original tires, to which the speedometer is calibrated. Generally speaking, if a "plus" wheel and tire package is desired, the overall diameter of the lower- profile tire should be within about 2 1/2% of the original. (For those of us who are absolute sticklers for detail and function, a knowledgeable speedometer shop can fabricate a small gearbox to attach to the back of your stock speedo so that its gear ratio can be increased or reduced to match the different diameter of substitute tires!)

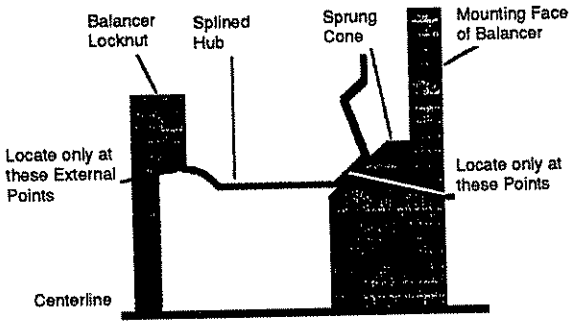
According to one major manufacturer of radial tires, the following tire sizes are direct conversions for the 6.00 x 13 originals on our Sunbeams. The underlined wheel rim width represents the rim used for measurements only. It is strongly suggested that candidate replacement tires and wheels should be checked on the car, if possible. Neither the author nor the Editor assume responsibility for verifying proper clearances under all operating conditions!

Wheel Rim Size Range	Tire Size
4", 4 1/2", 5", 5 1/2" 4 1/2", 5", 5 1/2", 6", 6 1/2" 4 1/2", 5", 5 1/2", 6", 6 1/2" 5 1/2", 6", 6 1/2", 7", 7 1/2"	165 SR 13 185/70 SR 13 185/70 HR 13 205/60 HR 13, -VR 13
5", 5 1/2", 6", 6 1/2" 5", 5 1/2", 6", 6 1/2", 7" 5 1/2", 6", 6 1/2", 7", 7 1/2" 5 1/2", 6", 6 1/2", 7" 5 1/2", 6", 6 1/2", 7", 7 1/2"	185/65 HR 14 195/60 HR 14, -VR 14 205/55 VR 14 195/65 HR 14, -VR 14 205/55 VR 14
5 1/2", 6", 6 1/2", 7", 7 1/2" 6", 6 1/2", 7", 7 1/2", 8", 8 1/2", 9" 6 1/2", 7", 7 1/2", 8", 8 1/2", 9" 6", 6 1/2", 7", 7 1/2", 8"	205/55 VR 15 225/50 VR 15 225/50 ZR 15 215/50 VR 15
5 1/2", 6", 6 1/2", 7", 7 1/2", 8" 7 1/2", 8", 8 1/2", 9"	195/50 VR 16 225/45 VR 16

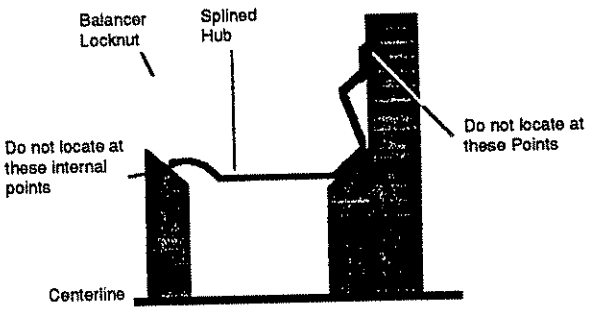
Balancing of Wire Wheels

If you are having trouble getting your wire wheels properly balanced, or feel that there are too many weights on them, you might have a problem with the method in which the wheels are mounted on the balancing machine.

Many unbalance problems do start with the incorrect mounting on the balancer. The following pictures show how it should be done.



Correct Method of locating the wheel



Incorrect Method of locating the wheel

Wire Wheels

M.G.B. 14" wire wheels slide right on the existing splines and clear the fenders when used with 175 x 70 tires. They have the advantages of lowering the engine R.P.M. for any given speed, raising the car slightly and having a better appearance.

Stock Wheels

by Stu Brennan

In the late summer, I received a call from George Levin, a member of the Sunbeam Tiger Owners Club (England) from Glasgow, Scotland. He was visiting the Boston area and had been given my name by the staff of the Museum of Transportation in Brookline, where we hold the British Car Day Picnic. We were unable to meet before his return home, but we have corresponded several times since. One of the items received was the Autumn issue of the STOC magazine. This issue was just over 60 pages in length, full of letters, articles and photos submitted by the membership. Many articles were long, surprisingly well written, and—more often than not— ripe with "tongue in cheek" comments. It made for really great reading. Their articles show them to be an incredibly active bunch with details on numerous gatherings (such as their annual trip to Le Mans for the 24 hour race and "Tiger Hi Noon", their celebration of the 25th anniversary of the Tiger—July 23, 97 Tigers present). One article in their Autumn issue concerned Mark Pollard, a member who runs a Tiger in a HSCC racing class that requires totally stock cars. One of his OEM steel wheels suffered a horrifying failure around the bolt holes during a practice session at Oulton Park (fortunately resulting in only a bad scare and no injuries). Pollard was petitioning the officials of the racing club to allow a modern wheel to be substituted. He pointed to the Rootes Competition Options Manual issued in 1965 that specifically stated that the stock steel wheels were only suited for street use and would not be safe for any form of competition. Several similar failures on "works" rally Tigers of that era were cited (in the December issue of Classic and Sports car, another British monthly, it was mentioned in two articles that Pollard's request had been approved). This is something to consider if you autocross or place abnormal stresses on your stock wheels.

A Wire Wheel Quicky

by Steve Finberg

An excellent instant replacement for worn or missing spoke liner can be made from a FR14 inner tube cut 2" wide. This can be made from an old "dead" tube, probably available for free, in the tire shop's junkpile. This is especially convenient when the need is discovered at the last moment. For those who haven't had the "pleasure" of servicing real wire wheels as fitted to some of our Alpines, the spoke liner is a rubber band that keeps the center spokes from punching holes in the inner tube. Any time a tire is changed an inspection of the inside surface of the wheel is called for. All surface rust should be wire brushed off (yes, it rusts in there due to water entering via the spoke holes) The spoke ends should be felt for rough spots and any filed smooth. A few minutes at this point will make a world of difference in innertube life and reliability. Years ago the tire station mechanics knew to do this, but today we are lucky to find someone even willing to touch a wire wheel, and it may be difficult to talk them into letting you interrupt their work, but it is worth it.

Rim Problems

Author Unknown

Check your stock rims for any sign of stress cracking. This should be a routine inspection. You can imagine the catastrophic effect of the rims cracking and parting company at highway speed. Several cases have been reported in the early stages and the rims are relatively cheap and plentiful.

Tire Sizing for Stock Alpine/Tiger

Author Unknown

Question: What size tires (the largest) will fit on a stock Alpine or Tiger front end with enough clearance?

Answer: The largest I can recall is 215-60's on 13"x 6" or 7" wheels. Any oversized tire requires trimming the lip off of the front apron so tire edge does not rub when wheel is turned left or right. Be sure to trim enough off apron edge so the tire does not catch it while applying brakes when car is traveling in reverse.

Typically the largest size which may be installed without requiring sheet metal modifications is 175-70 or 205-60. To be safe, plan on 165-70 or 185-60.

There are many variables when sizing tires for your car. Differences do exist between brands and style, rim offsets and the cars themselves. The old adage holds especially true on this topic; measure twice-cut once. Nuf said!

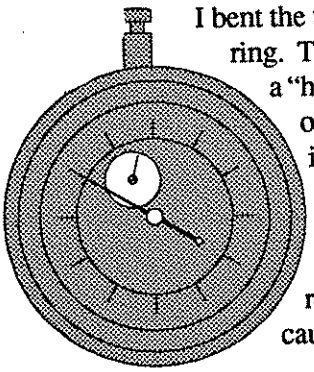
Installing an Additional Gauge

by Stu Brennan

If you're like me, and you want to know as much as possible about what's happening with the systems in your car, then you have probably considered adding an extra gauge. I wanted to add a voltmeter, but where should it go? I didn't want to hang it under the dashboard. I already had an ammeter, so the only spare hole in the panel was the clock opening, covered with the blockoff plate since the clock was not present. But, the hole was too large for the standard gauge size.

The solution was simple. The clock blockoff plate is made of two sections; a metal ring and a plastic disk. The disk is held in place by some little metal tabs. Carefully bend up the tabs, and the disk comes out.

Now you have a choice. The gauge body will fit through the clock ring, but the gauge's trim ring won't. The easy way is to install the gauge is to drop it in through the ring, widen its U bracket and you're done. I didn't like the way it stuck out, so I chose to mount it to the ring from the rear.



I bent the tabs that held the disk to the gauge in place behind the ring. They are not strong enough to do the job alone, so I used a "hot melt" glue gun to secure it. I really globbed the stuff on, making a complete ring around the gauge and fully immersing the tabs. This glue sticks to itself well, but doesn't do as good a job sticking to other things. With the complete ring and the immersed tabs, it holds together well. But if I ever want to remove the gauge and replace the disk, it should all come off easily. To be cautious, I didn't tighten the U-bracket nut too much.

With the ring and the gauge's trim polished, the size difference is noticeable, but not remarkably so. It's far less obvious than the front mounted option, and it certainly makes the panel look more complete. And the price is right.

Additional note: The Smiths voltmeter I used had been salvaged from a TR-6. The inner portion of its trim ring was painted black. This paint came off easily and the whole thing polished up nicely with some Simichrome. The pointer was white, so while things were apart, I used some Testors orange to make it match the other Tiger gauges. I didn't try it, but a "black ring" gauge might look good behind the polished blockoff ring, also.

Series IV, V, and Tiger Mark I and II Horn Hint

Over the years of use, the horn rings either break or they become bent to the extent that the horn ring hits the steering wheel spokes before it makes its internal electrical contact and turns on the horn. A broken horn ring can be replaced with one of the nice repro units being made. For bent rings there is an easy fix which can be done in about an hour.

What is done is that the horn ring is removed and reinstalled with 3 spacers under its mounting plate. These spacers could be washers for 3 small nuts like the 1/4"-20 size which you probable have in your parts bin (or they can be bought at the hardware store).

To remove the horn ring, first take off the padded center of the steering wheel. This padded wheel center is a press fit into the telescope adjustor ring. If you look around its edge, you will notice a small notch on one spot of its chrome. A thin bladed screwdriver can fit into this notch to pry out this padded wheel center.

Under this wheel center will be a bolthead with a washer under it. Remove this bolt with a 1/2" wrench and then you will be able to wiggle off the steering wheel height adjustment ring.

With the adjustor ring off, you will see the metal center of the horn. There will be three screws, they may be Phillips head or regular slotted, which held the horn ring assembly to the black plastic hub. It's under these three screws that we will put the spacers.

Remove the three screws and have somebody hold the ring in place as you prepare to put in the spacers. The reason to hold the ring is that there is a wire attached to the horn ring which goes through the steering wheel hub and onto a slip ring. This wire can get pulled off its spade connection on the slip ring if the horn ring is pulled away from the steering wheel (Don't worry if this happens. Just remove the three screws which hold on the bottom of the black steering column cover and reattach the wire to the spade connection on the brass slip ring).

The only annoying part of trying to put the spacers under the 3 screws holes of the horn ring is that they will want to fall out of place as you reassemble everything. The last time I did this job, I used a model maker's trick and tacked the three spacers into position on the metal horn ring with a few drops of Crazy Glue.

While you have the horn ring out of the wheel, you may also want to adjust the sensitivity of the switch so that you don't have to push it to too far an angle before it honks. To adjust this, first notice that there are three small studs attached to one part of the horn ring. On these studs are springs, and plastic electrical insulating washers, with self locking nuts. The springs hold apart the two metal parts of the horn ring and when those two pieces touch - the horn blows. By tightening up the three self locking nuts so that a smaller air gap exists between the metal plate. You might use a match or thin piece of cardboard as a spacer to help gauge the gap.

When you reassemble, notice that first there is a thin copper or brass colored spring which sits against the big nut which holds the steering wheel in place (small end goes down). On some cars, you will see a small white nylon piece of plastic which holds

the steering wheel adjustor shaft from falling into the steering column. If this steering wheel adjustor shaft falls down the middle of the steering column, then telescope the steering wheel down toward the dash, grab the center steering wheel adjustor shaft, and pull it back up. Put on the rest of the parts in the reverse order that came off and hopefully your Clear Hooter horns will be back in action.

Blower Motor

from CAT

One thing to check before replacing your heater blower motor is that it's really broken. I discovered, after a period of non-use, that the friction in the bearings can be greater that the torque developed in the windings and mine wouldn't turn. Since it can't move, the wires get hot and, at best, a fuse blows. A smoldering fire is not unheard of.

If your blower isn't working, remove the deflector assembly and associated works under the dash and remove the three main mounting bolts. Rotate the blower assembly out of the large rubber adapter and turn the squirrel-cage blade. Spin it once or twice and then apply power. If it starts up, it's not burned out, just stuck.

The lower bearing is inaccessible without disassembling the entire motor, but it's possible to lubricate the upper bearing if you use a long, pointed applicator and 10W oil. Keep oil away from the plastic squirrel-cage, as British plastic, like their rubber, may self-destruct. Run the fan to work oil into the bearing and exercise it regularly to keep it running.

A Fix for Faded Gauge Needles

by Jim Morrison

Even some of the cruddiest looking gauges can be brought back to show condition through a careful disassembly and cleaning of the chrome bezel, glass and gauge face. This procedure has been described in the CAT shop notes and other places. When I got my gauges looking spotless, the sun faded needles were very obvious especially after I had my speedometer rebuilt. The bright orange needle on the speedo accentuated the yellowish needles on the other gauges. After deciding to paint all the other needles, the hard part turned out to be finding a paint the correct color to match the speedo. After much searching in hobby stores, paint stores and hardware stores, I discovered the perfect paint: Testors Model Master Fluorescent Red (FS 28915). In painting the needles, I slid a thin piece of cardboard behind the needle prior to painting to protect the gauge face from an accidental painting. One word of caution: The needles are very fragile and care should be taken that they are not bent or the gauge movement damaged. (ed note: Painting speedometer and tachometer needles may affect their accuracy. Several coats of paint on a needle can cause an error of about 300 RPM on tachs or 4MPH on speedometers when the needle is at the 6 or 9 o'clock positions.)

Turn Signal Preventative Maintenance

by Dan Cameron

For the second time in the history of owning my Tiger, I have had the turn signal cancellation device fail; that is, when completing a turn, the signal would stay on. There are three probable causes for this symptom. Let's take them one at a time:

1. **Broken cancellation arm** - the mechanism that cancels the turn signal is located at the base of the turn signal lever, under the steering column cowl. This rather fragile plastic part is prone to break (either one or both arms). The problem could be the result of improper adjustment—covered later—or just due to under-design. The fix is pretty straightforward. After purchasing a turn signal repair kit, remove the steering column cowl (bottom half comes off first), unplug the electrical wires under the dash and remove the entire lever assembly from the column. To replace the broken cancellation mechanism, the pivot pin must be removed. This must be drilled out due to the end opposite the head being upset (mashed over). Caution must be taken not to lose the small spring that spring loads the brass contact. At this point I ran into a slight problem with the new plastic cancellation mechanism. It has been beefed up in the area most prone to fail, however, now it won't assemble on the die cast body. I carefully relieved it with a knife so as to assure it was fully seated. Next, I replaced the pivot pin (two provided—pick correct one), peened the end for retention and installed the assembly on the column. Now, the all important step—adjustment. There is a stamped metal strap with a tab on it (looks like a hose clamp) that engages the plastic cancellation arms upon returning the steering wheel to the straight ahead position. The tab should be centered between the two arms and, when rotated past the arms, apply just enough pressure—real scientific—to disengage the turn signal. I firmly believe mine applied too much pressure adding to the failure problem. A tap or two with a small hammer will do the trick. Finally, ressemble the cowl, field test your signal and you're off!!
2. **Improperly positioned cancellation strap**-remember the metal strap referred to earlier with a small tab on it that engages the plastic arms? Well, if it has been rotated out of position, it may cancel the turn signal in one direction only or not at all. This is often the result of loosening the entire steering column for engine removal or whatever. As before, check its position for location between the plastic cancellation arms. Make adjustment as necessary.
3. **Improperly adjusted cancellation strap** - as in #2 above, the object of our attention is the cancellation strap. However, this time we are concerned with the degree of contact with the plastic cancellation arms. If the metal tab has been bent in toward the center line of the steering column, it will not engage the plastic arms. To correct this condition, merely pry it out until it just barely makes contact with the arms. This is very important or the plastic arms will be overstressed and prematurely break.

Fog Light Mounting

by Steve Finberg

Most of the fog light installations that I have seen are made to the front valance panel. Unfortunately the valance vibrates quite a bit on rough roads, noticeably shortening the life of the expensive quartz iodine bulbs. To provide a much stabler mount for two fog lights mounted below the valance, I welded a 3/4" square, hollow steel bar between the 2 frame ends directly above the front jacking holes. On my Series V Alpine this does not interfere with anything, including the hand crank. The bar was drilled prior to installation. In addition to being a stable light mount, it has proven to be an excellent tow point!

Alternator Conversion for Series I-IV Alpines

by Thomas Wiencek

It all started with a simple article in Practical Classics, November,1985, called "Good-bye DC...Hello AC!" After reading this article and since it was so easy to do, I decided to put an alternator on my Series II Alpine. One of my restoration goals is to make my Sunbeam as reliable as possible. Any parts that can be replaced with modern (easily obtainable) components make any classic a little more enjoyable to drive. Who is going to miss unscheduled rechargings and dead batteries? After four months, many trips to the auto parts store and much reading and researching in the library, it's finally running. To save others from solving the same problems, I thought I would share my experiences (what else can you call them?). Please note that this installation is for a Series II. There may be some differences for a Series I, II, or IV; but I am sure an alternator can be installed on these autos also. (ed note: T.W's. saga relates to all Alpines using factory headers common to series I, II & III.)

So off to the junkyard I went and soon I returned with a used General Motors alternator with an internal regulator. A little bracket adaptation, simple rewiring and in five minutes I would be finished (Rule #1—THERE ARE NO FIVE MINUTE JOBS).

After removing the stock generator and an hour of fitting, I found out that the only way this alternator would fit would be to remove the stock headers or to grind away the front engine mounting plate (Rule #2—IT IS ALWAYS A GOOD IDEA TO MEASURE BEFORE ANY JOB).

Both of these options were unacceptable (anyone need a good, used GM alternator?); so with ruler in hand I measured the space for the generator and started to think (Rule #3—THINK!), I brought with me to my favorite auto parts store an alternator bracket from a Series V (Rule #4—ONLY MAKE CUSTOM PARTS IF YOU HAVE TO). A good parts person who is willing to help make something work is the best friend a restorer can have (Rule #5—BE EXTREMELY NICE TO AUTO PARTS COUNTER PEOPLE.) The first alternator we measured was for a Series V Alpine. It was too big. Next, we tried a 1971 Plymouth Cricket alternator (this car was a Sunbeam in disguise). It was also too big. A quick trip to the back room, and he returned with a Mitsubishi alternator built by Lucas. It fits '78-'80 Datsun pickups, '82-'84 Mazda B2000's and '82-'84 Ford Couriers. It was small and had an internal

voltage regulator. The price was steep—$90 rebuilt—but it fit and bolted up to the Series V bracket. The only modification was to tap the outer bolt hole in the alternator to an English thread (5/16 - 24). By relocating the generator belt tension bracket on the water pump, everything bolted up. Now all that was left was the wiring. Series II Alpines are a positive ground system; therefore before cutting any wires your car must be converted to a negative ground system. This has been nicely covered in a previous Tech Tip, so I won't go into any detail. It is very easy to do. Be sure everything is okay with your generator powered negative ground system before you continue your alternator installation (Rule #6—WHEN FACED WITH THE UNKNOWN, ONLY CHANGE ONE THING AT A TIME.)

Figure 1 is a schematic of the wiring for a Mitsubishi alternator. The alternator has four terminals: R = sensing wire;
L = load;
B =battery;
G = ground.

The only important note is if your car has no charge indicating lamp, a heavy duty 15 ohm resistor must be wired where the lamp is shown.

Table I

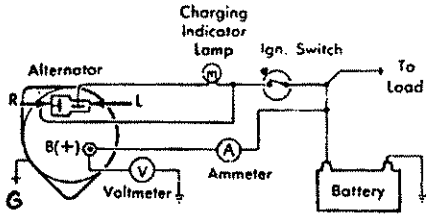


Table I gives the wiring of the stock voltage regulator. It is a GOOD IDEA to label the wires as you remove them one at a time (See rule #6). Do not be too surprised if your wire colors are different. Remember, your car is a Sunbeam and could have been changed over the years. Also, I am a little color blind and could have gotten the colors wrong. Next, remove the voltage regulator, generator and save (Rule #7—NEVER THROW AWAY ANY SUNBEAM PARTS). Then, connect the alternator as given in Table II.

Table II

Terminal	Color Wire	Connects To	For Alternator
A1	Blue Brown	Ignition Switch	B
A	Violet	Non-Battery Side of Ammeter	B
F	Brown	Generator	Not Used
D	Yellow	Ignition Light	L
	Yellow Brown	Generator	Not Used
E	Black	Ground	Not Used

Be sure to keep the wire gauges the same size as the original wiring. I bought a two prong plug that fits the alternator to keep the installation neat but well insulated quick slide wire terminal connectors will do. The only new wire to run is for the "R" terminal or sensing connection. I made the connection at the ignition switch where the wire runs from the ignition light to the ignition switch. Once everything is connected try turning the key on. The ignition light should come on. Turn on the headlights and check if the ammeter is reading okay. If everything works you are almost finished. If not, check your wiring. The last step is to buy a new belt. I found

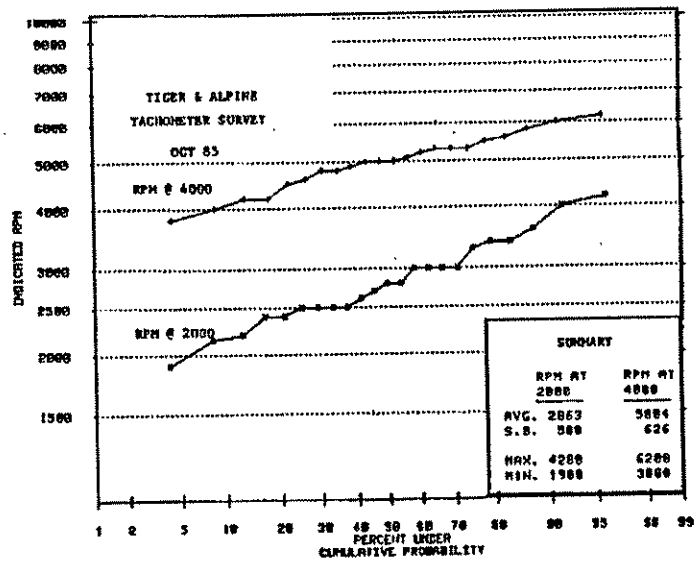
that a 9.5mm x 938mm belt will work, but it is a very tight fit over the pulley. A 945mm may be a better choice. Just to be on the safe side, I wrapped some high temperature insulation on the first header tube to try and keep some heat away from the alternator. That's it. Turn the engine on, rev it and if the ignition light goes out, everything is working and your dead battery problems are over.

Tachs in Review

by Tom Ehrhart

A survey was made during United IX of Alpine and Tiger tachometer accuracy. Using calibration equipment traceable to National Bureau of Standards (Now NIST), a total of 24 Tachometers were scrutinized by Doug Pruitt of Frederick, MD. Car owners were asked to remove their tachs throughout the weekend so Doug would be kept busy, since he had been bored during the last several Uniteds. Someday when he gets his Tiger on the road, he can calibrate his own tach, too! What Doug found was this: All tachs had errors—some were gross. And most tachs had significant errors that are inappropriate for normal car operation. Since there are no published specifications on Tach accuracy, we must conclude our own based on liberal interpretation of available information, such as calibration points ("..") marked on the meter face by the manufacturer: +/- 50 RPM Tolerance @ 1500 RPM, 4000 RPM for 5500 RPM and so and 100 respectfully for 7000 RPM Tach. This summary reflects data derived with the calibration standard at 2000 and 4000 RPM, since these are the most common points of interest. However, tachs in the Survey were checked at 1000 RPM increments up to the maximum indicated. The cumulative probability plot that follows provides an interesting summary of the survey. First, it shows the actual error of each tach checked. And second, based on a random sampling of the two dozen Alpine/Tiger tachs, indicates the probability of error of other tachs (yours) not checked. In essence, we can conclude that 50% (ave. based on a normal distribution) of the tach population will be 863 and 1004 RPM too high @ 2000 and 4000 RPM respectively. Or to make you more paranoid, 85% (from 10% to 95% probability) of the tach population will be above our liberal interpretation of factory tolerances.

This is the second survey of this nature. The first survey was United VIII at Niagara Falls, NY, which yielded similar results. An out-growth of this survey is that our tachs are dwell sensitive. While most Alpine owners retain their original ignition systems, many Tiger owners do not. Tiger owners many times opt for the OEM Ford dual point, Accel, Mallory, etc. with and without dual points. Most times these bastard (non stock) systems will not allow our tachs to work accurately, or for that matter, at all. There is no damage to the tach, so no need to worry. Depending on the ignition system used, merely exchanging another tach is all that is required to get working again. There are many other ways, too. Changing the number of turns on the tach pickup

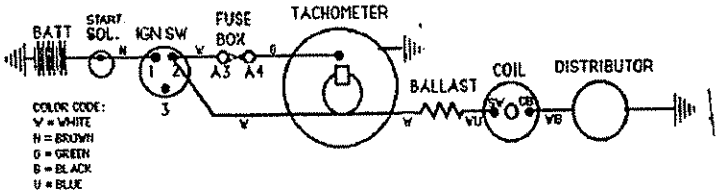


loop, resistors, pulse shaping circuits, etc. The latter of which no known black box is available for resale on the open market that "works". Doug Pruitt has threatened to make a "black box "for resale. Perhaps this public notice will get his and others attention who would be willing to work on the project. In summary, our tachs are extremely dwell sensitive and according to this survey, highly suspect. Solution: have your tach calibrated by a competent source and be on guard when using non-stock ignition systems or contact Doug and demand he build black boxes.

Sunbeam Tachometers

by Paul Dierschow & Tom Ehrhart

Shown below is a wiring diagram for a MkI Tiger with the tachometer circuit highlighted. Although the harnesses are different for Tigers and Alpines, the principle of that circuit is exactly the same. This is also true of most other British cars with electric tachometers from the 1960's through the early 1970's.

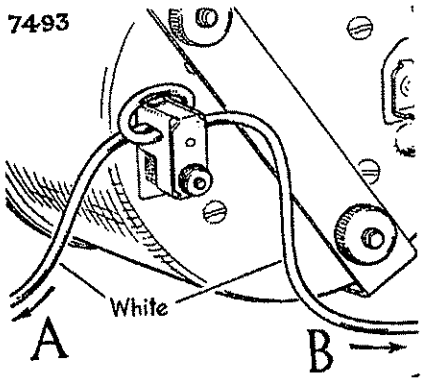


The tachometer circuit is removed from the factory wiring diagram and rearranged, showing the simple concept of this design. Several items are important to remember in understanding this circuit:

1. The ignition coil receives its power via the tach loop wire (white).
2. The tachometer must also receive constant switched power (green) and must have the housing grounded (black).
3. The tachometer is simply a voltmeter that mea sures the voltage generated by an internal printed circuit corresponding to the number of pulses produced by the coil in the low tension circuit.
4. The counting of these pulses is affected by variation in dwell angle or point gap, especially with dual point and after market distributors.
5. The inductive loop of wire on the back of the tachometer must be properly oriented for the system to function.

TACH WIRE HOOK-UP

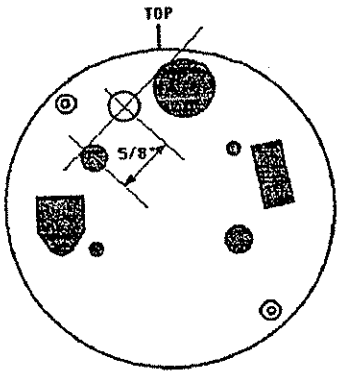
Subjcet: Impulse Tachometer Cable Installation for negative ground
(reverse A & B for positive ground system)
Ground wire must be attached under one of two knurled mounting posts. Other end of wire must be connected to car chassis.



A. To SW terminal on coil, or to 12 volt terminal of coil. When using ballast resistor, this lead must be the input lead to the resistor. The resistor output lead will go to the coil
B. To no. 2 terminal of ign. switch, or to a 12 volt source that is turned off with the ign. switch.

Calibration - since the tachometer is simply a pulse counter, all tachs of this type are basically the same, differing only in calibration, type of ground, and face design. It is, therefore, possible to use the unit from an Alpine or an MG and change the face and recalibrate to have a suitable replacement for a defective Tiger tachometer. To replace the face, remove the bezel, glass and glare ring. Remove the needle with its hub from the tiny shaft very carefully by prying both sides gently and evenly at the same time. Then, the two small black screws are all that hold the face to the body. Since the unit is simple to recalibrate, it is also possible to put in a unit with a higher range of reading to accommodate the capabilities of a high performance engine. A tach without any indicator jewels on the face would be preferable, since light from the face illumination bulb would show through unless covered. A Series V Alpine has a 7000 RPM tach with the proper face style to match a MkII Tiger. Recalibration procedure is as follows:

1. With the tach removed from the car, remove the chrome bezel, glass and glare ring by turning and aligning the tabs with the gaps in the housing. It may be necessary to bend up the tabs slightly to be able to loosen the bezel enough to turn.
2. Remove the two screws from the back of the housing that hold the assembly to the can. Look carefully, as two other screws do not release the guts but are part of the internal assembly.
3. Now a 5/8" diameter black (or yellow) plastic variable resistor is exposed. It has a narrow screw slot in it that is easily turned slightly for exact calibration, or more to change from four to eight cylinder reading.
4. The tach can now be rewired temporarily in the car and adjusted while it runs parallel to a good quality dwell tach and matched to that reading (tech ed. note: tachometer calibration will ensure accuracy over a small range around the point of calibration. For example, if adjusting the tach to 3000 rpm it will likely be accurate from at least 2000 to 4000 rpm. Although possible, in most instances, do not expect your tach to be accurate at 1000 and 6000 rpm if it was calibrated at 3000 rpm. This is the required calibration by professional instrument rebuilder.)
5. If necessary, for future adjustments, you can drill a hole in the proper location on the back of the housing to make recalibration easy without removal from the car. Use the following template:



Template to accesss variable resistance for calibration

Changing Grounds - Should you want to use a positive ground tach, or change your Series IV Alpine from positive to negative ground, it is easy to convert your tach for proper operation.

Follow this procedure:

1. Remove the guts of the tach from the housing as listed from above.
2. On the rear most board, find the large brown resistor that connects to the terminal for the large green wire (power) from the harness and the small green wire soldered to the silver button adjacent to it (ground).
3. Carefully unsolder these connections from the board.
4. Reverse these two connections and resolder. You can cut the long lead from the resistor or bend it backwards to fit properly. (ed note: CAUTION; Items 1,2,3 & 4 apply only to tachs where the printed wiring board [PWB] ciruitry do not come in contact with the metal meter frame. Examine carefully. It will be necessary to modify the circuitry if it comes in contact with the meter frame.)
5. Reassemble the unit. If you are changing the car from positive to negative ground, you must also do the following:
6. Mark and cut the white induction loop wire a couple of inches from the plastic block.
7. Reverse the connections, resolder and tape them. Don't forget that this is your ignition lead, so be sure the connections are good.

Tach Calibration

by Chris Barker
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If things have worked out as Paul Norton and I intended this article should accompany one by him on the intimate details on electronic revcounters. He will tell you all about resistors and thermistors. I am going to show you how to check whether they are all telling the truth. It's human nature to believe implicitly what instruments say (except perhaps the oil pressure gauge), and I have met owners afraid to go above 70 mph because "the revs are on the limit". Unless you're still in 2nd or someone has fitted a 9:1 axle this isn't possible, and it is more likely that the speedo is reading slow or the rev counter is fast. If you still have your licence it's probably the latter! There are only two problems in checking a rev counter. The first is giving it some revs (pulses) to count; the second is knowing how many. I had vaguely thought about using a thing called a signal generator, but these are not found in many peoples' tool boxes and I am not sure whether one would work anyway. No matter, a much easier way is to setup a real ignition system on the bench. Find an old coil and distributor—any will do but there is less math involved if it's for a 4 cylinder engine. The only other things needed are an electric drill, an electric light and some way of cutting out sunlight. One easy way is to do it at night. In case you have not already guessed, the drill is to spin the distributor. A variable speed drill is best, a two speed one will do and you can do something with just one speed. A piece of wood held against the side of chuck will give a fine speed adjustment.... To join the drill to the distributor find 4" of metal tube as big as will fit in the chuck. Cut a slot in the other end and spread this end enough to fit round the distributor drive. It should not be a tight fit. You now have to clamp everything together and I found a Black &Decker Workmate ideal. You should now have some revs to count.

The next step is to remove your rev counter. The earth connection is on one of the knurled fixing nuts and the live feed is on the only "Lucar". The bulb holder pulls out complete and this only leaves the sensing coil wound through a nylon block on the back of the instrument. Make a careful note of how it's fitted and remove the small knurled nut and steel bridge piece. The nylon block is part of the loom and stays in the car. Wire up the system per your car wiring diagram. Arrange a turn of wire (without a nylon block) correctly under the steel bridge piece. See "Sunbeam Tachometers" in this issue. All that is left now is to count the revs you are putting in and this is the clever bit. You will see a patterned disc on the rotor arm. This is cut from white card and is about 75mm diameter. You can mark a ring on it with a four of equally spaced black segments. It's attached to the rotor arm with a dab of glue. When seen with fluorescent light powered by AC mains each ring will appear "stopped" at a particular speed. In this country, with 50Hz mains the formula is: "stopped" speed = 12000/# of segments so rings with 3, 4, 6, and 12 segments will give you 4000, 3000, 2000, and 1000 rpm. For 60Hz mains multiply these speeds by 1.2. If you have only a fixed speed drill choose the number of marks so that the "stopped" speed is just a little lower that twice your Drill's speed e.g. for a 1300 rpm drill mark 5 segments and calibrate at 2400 rpm by applying a slight brake to the drill chuck. I found that I only needed to alter the tachometer's electrical adjuster to get an accurate instrument—it is best not to touch all those fine balance springs if possible. On the SV unit the adjuster is inside the back, between the bulb position and the nearest threaded stud. It's black plastic, about 1/2" in diameter This may all sound a bit hairy but in fact it's quite simple and very accurate—have a go. The strobe method also has potential for checking cable driven speedometers and rev counters but you would need either a reversing drill or a means of reversing the direction of drive. One way would be to have a friction wheel on your drill driving a second wheel which carried the strobe disc and drove the cable the right way. For a speedometer the turns per mile figure on the face would also be the rpm for 60 mph and "stopped" rpm = 6000/# of segments.

Finally, to those curious enough to check my formulae I do not know why the disc only appears "stopped" at twice the speed one would expect but it does—I have allowed for the distributor only turning at half the engine speed so that is not the answer.

Even more finally, I haven't tried it but I suspect that touching the H.T. coil terminal would not be pleasant so keep your fingers away when running!

Tach Accuracy

by T.T. Cantwin

Surveys have been made at variuous UNITEDS to determine the accuracy of electric tachs used in Alpines and Tigers. Tiger Tom uses a tach calibrator which is capable of calibrating tachs for Alpines and Tigers with single and dual point distributors. One survey produced the following results.

Tachs were checked using single or dual point operation as requested by the owner.

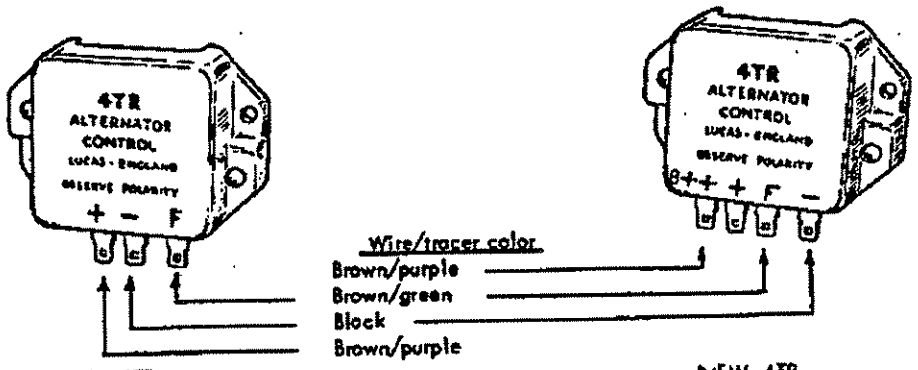
Tach #	Tach Type	Point Type	Error @ 4000 RPM
1	Tiger	Dual	+ 200
2	Tiger	Single	+ 1000
3	Alpine	Single	+ 1000
4	Alpine	Single	+ 850
5	Tiger	Dual	+ 750
6	Alpine	Single	+ 400
7	Tiger	Dual	- 1000
8	Alpine	Single	- 800
9	Tiger	Single	+ 600

Out of the nine tachs tested only one (#1) was within acceptable limits. Generally, they indicated higher than actual RPM, which most likely saved a few engines. It should be noted that an indicated error at 4000 rpm is not necessarily a linear error over the range of the tach. Values shown at 4000 rpm are merely an indication of general tachometer accurary. Therefore, tachs must be checked at other RPM points to determine actual accuracy.

Alpine 4TR Voltage Regulators

by Tom Ehrhart

The venerable Joseph Lucas Ltd. has done it to us again. The infamous 4TR regulator used on the Series V Alpine has been changed from a three (3) terminal unit (Figure 1) to a newer four (4) terminal unit (Figure 2). Both units are electrically the same as far as use in the Series V is concerned. Just reconnect wires as shown in figure 4. DO NOT connect any wires to the + terminal of the four (4) terminal unit when using this unit in a Series V. As a safety precaution be sure power is off i.e., no voltage is present at the wires to be connected to the regulator. To be sure, you should disconnect the battery.



OLD 4TR
FIGURE 1

NEW 4TR
FIGURE 2

Battery Problems

Author Unknown

The battery should not only be disconnected for winter storage, but removed entirely from the luggage compartment. We know of at least one damaged car (Note: maintenance free batteries are not without fumes). The several minutes spent each time you run the car may save headaches, frustration and dollars later. Your battery should be fastened down properly at all times , don't even test drive the car without properly securing your battery. If the OEM tie down is not available, improvise. We recently repaired a quarter panel sustaining damage from an electrical fire. The driver was lucky considering where the gas tanks are located. Again, a small investment of time and money saves one large headache later.

Hood Release Improved with Older Parts

by Stu Brennan

Those of you who have the "bicycle brake cable" style of hood latch release, may have looked in envy at the "solid rod" type releases on earlier Sunbeams. I know that I was always concerned that the cable might fail and leave me with the prospect of cutting metal to open the hood.

If you have ever thought of converting, you will be glad to know that the rod type release from earlier cars is a bolt on replacement for the cable setup. I found an older release, complete with the slotted adapter (important to have) that connects the rod to the arm of the latch, at a parts swap. It bolted right in to my '67 Mk 1A Tiger, using the same mounting holes as the original assembly, with no clearance or travel problems.

If you can't find an old release, then it might be possible to fabricate something on your own. A piece of coat hanger could be used as a model to get the bends and lengths right, before you fabricate the actual rod. The portion of the rod hidden in the heater plenum is perfectly straight, and there are only two other bends. Copy the slotted adapter from an existing setup.

The rod could be shaped to provide a hidden release, out of sight, just behind the dashboard. Or, if you are feeling even more inventive, I'll bet there is a way to cut down the old release cable, and have it pull on the end of a solid rod that comes through the firewall. That way, if the cable broke, you could still reach up under the dash and pull on the rod.

Rotisserie

By Robert J. Jaarsma

Introduction

The "Rotisserie" described in this article, was spotted by my son , with an Alpine hanging in it upside down.

I wound up with this unit, originally constructed by Jeffrey Angwin of Newport, NH. Since that time two Tigers have been supported by the unit. In all now three (3) cars. It has proven to be an invaluable tool for the serious restorer. It saved many hours of time and eased the resurrection of the underside of the Sunbeams. The car can be turned around with ease or even tilted on its side. All work underneath, including the installation of brake lines, fuel line, rear-end and front-end, was done with the car mounted in the rotisserie.

Precautions

Before you do anything, you have to determine how strong (or weak) you car is in its Present state. Measure the opening of the doors, top of A-post to top of B-post. Jack up one corner of the car with the Sunbeam jack. Measure the same dimension. Do this for all four corners of the car. If satisfied that no measurable deflection takes place, inspect all four mounting nuts of the bumper mountings. These should be

securely fastened to the ends of the main frame rails. If these nuts do not pass your inspection or you are in doubt about their structural soundness, take care of this problem first. Weld the nuts securely in place. I found on one car one of these nuts "somewhat silver soldered", certainly not sufficient to support the weight of the car.

If measurable deflection of the frame was observed over the door openings, the optional reinforcement bars (in drawing called :Support Braces) should be mounted between the middle part of the B-post to the A-post. Four (4) holes will have to be drilled for each bar for mounting. However the interior panels will cover these up later. The flexing of the frame can now be limited, so that later your doors will fit perfectly. Note: check your door spacing before the final installation of the braces and disassembly of the doors!

If completely satisfied the doors can now be take off. The lifting brackets, front and rear, can be mounted to the car. The car can now be aligned and hooked up with the pivot points of the rotisserie.

Gradually elevate the front and rear in tandem. When the car is off the ground, wheels, front-end and rear-end can be removed. Raise the jacks further, till the pivot points are approx. 35" above the floor. Now enough height is gained for unobstructed rotation of your Sunbeam (unless you leave tools and parts on the floor).

Work all around your Sunbeam can now begin.

Advantages

1. A relatively simple and inexpensive rig.
2. Can be disassembled to a large extent for storage or transportation.
3. Casters could be added as an additional convenience. For example, moving in/out garage for sandblasting or painting is easy. (Note the movers 'dollies in the picture).

Disadvantages

1. Frame of the car has to be fairly solid.
2. Bumper mounting nuts must be in good order.

Construction Details. (See drawing).

For ease of disassembly, plates #4 are bolted to U-channel frame and pipe #9. Weld plates #4 to angle iron #3 to fit.

Sequence:

1. Build floor frame of U-channel.
2. Weld support #5,6 to pipe #8.
3. Weld pipe #8 to frame.
4. Make adjustable sleeve/pivot (#10,11,15).
5. Erect pipe # 9.
6. Mount sleeve/pivot on pipe #9.
7. Mount plate #4 on frame and at end of pipe #9.
8. Fit & weld angle iron #3 between plates.
9. Add reinforcements #12.
10. Make mounting/pivot brace (# 16,17,18).
11. Install the jacks.

If you do not want to be able to disassemble the unit, simplifications can be made as follows:
Omit plates #4, screws #20, pipe #8, screws #21.
Weld #3 to #1, #9 to U-channel, #3 to #9, #16 to #18, Omit #14, weld jack directly to plate #6.

GOOD LUCK ———

Exhaust Notes

by Dan Cameron

Many of our Tiger and Alpine members have spent a great deal of time, effort and money restoring their cars only to find that within a few months' time that once shiny exhaust system is beginning to rust. In a most recent effort to keep the underside of my Tiger as appealing as practical, I decided to hit this one head on and am pleased with the results. Surprisingly, it was pretty easy on the pocketbook as well. The procedure used was as follows: -Have the exhaust headers and cone downs sandblasted to remove all paint, corrosion, etc. (approximately $20). For best results, try to handle the headers as little as possible prior to painting. -Paint headers with VHT, 1350 degree high temperature paint (not engine paint). It is best to spray a light coat initially, then follow it with two heavier coats—don't skimp. Drying between coats will help the curing process. (4 cans-approximately $20) -Purchase

stainless steel mufflers of your choice. I used Midwest sonic turbo mufflers for their free flow characteristics and compact design without excessive noise. They have a 2" center inlet and a 2" offset outlet. When positioning the mufflers, the offset outlet is away from the center of the car. The next step, finding a good muffler shop, may prove to be the most difficult, however, it pays to be fussy. There is no substitute for smooth bends and clean welds. I used 2", mandrel bent, aluminized tubing. This tubing is becoming commonplace and will maintain its metallic finish. With a little extra care on the bending machines, flattening the tubing where it passes through the frame is not necessary. Finally, bologna slices, chrome exhaust extensions were spot welded to the exhaust pipe tips. As an alternative, for that extra clean look purchase a longer variety of chrome exhaust extension (18-24"), drill a small set screw hole and split over present pipe—nice touch.

More Exhaust Notes

by Dan Cameron

For the performance buff that is always looking for that extra HP, don't overlook the exhaust restrictions. With the small block Ford, this is the major bottleneck. It does not do any good to try to put more in than you can get out. We have previously discussed the desire to have smooth bends and a non-flattened (where it passes through the frame) exhaust system. In addition, two other areas should be addressed. These are the mismatch of the header primary ports and the interface of the exhaust pipe tubing and the header collector cone. Let's discuss these one at a time. Initially, I disregarded the mismatching of the exhaust ports (heads) with the headers because dimensionally the header ports were larger. What I overlooked was the severe mismatch condition that occurred randomly, sometimes side to side and other times top to bottom. This is much more predominant when using the larger 351 W heads as in my case. To remedy the situation, using a header gasket as a template, I determined the extent of the errors on a port to port basis. This was used as a guide line for metal removal. Using a 1/4" drill (a little low in RPM but okay, a die grinder preferred) and a carbide rotary file, I blended the header primary flange to the primary tube. Carbide rotary files can be purchased through most industrial tool supply houses. In exercising the procedure above, extreme caution must be taken not to get carried away. There is not much material there to begin with. If you take the grinding too far and the metal becomes too thin or a pin hole develops, take it to a welding shop to fill the outboard side of the flange at the union of the tubing. All in all, this job was pretty easy. As for the area where the exhaust pipe meets the header cone down, I was in for a real surprise. With the header removed, I noticed my good old muffler shop stuffed the tubing into the cone down so far, at an angle to boot, it acted as a baffle to restrict the exhaust flow. As easy as the previous job was to accomplish, this one was a real turkey. The only solution was to lay for hours on the backside grinding away with a 1/4 inch drill and a coarse grained, 1-1/2" aluminum oxide grinding wheel. The collector cone was blended to the exhaust tube at the point of the weld. Six grinding stones later, I had a smooth transition from the header to the exhaust pipe.

Fender Well Cooling Ports

by Phil Lindsay

When your Tiger is crawling along in slow traffic, the under hood temperatures can go out of sight. All of the engine cooling aids such as aluminum intake manifolds, header pipes and extra large radiators depend upon dumping their heat into the engine compartment. What's needed is an underhood cooling system to remove this heat build-up when there is insufficient road speed to pull the hot air out of the bottom of the engine compartment. There are several ways to do the trick, ranging from the obvious hood louvers to exotic exhaust fan systems. Since I try to keep my Tiger stock in outward appearance, I choose to provide cooling ports without the addition of hood or fender louvers. With the aid of a chassis punch (the cup and die type used in the electronics industry), I made a series of 1-1/4" diameter holes in the wheel well area. Although a hole saw would also work, the limited access might be a problem unless the engine compartment was stripped clean. The chassis punch provides a very smooth edged hole which will work well with a rubber grommet plug. The diameter of the hole should match the grommet size. I was able to locate grommet plugs with a 1-9/32" diameter so I selected a hole punch with a 1-1/4" diameter. Obviously, if you don't drive your Tiger much in the rain, you don't need the plugs. I use the plugs only during the heavy rainy season (November - April). The number and location of the cooling ports probably isn't important as long as the hot air can escape. I have approximately 16 holes on each wheel well and in order to avoid weakening the wheel well, I spaced the holes at least an inch apart. Try not to place the holes directly in line with the electrical connections on the generator voltage regulator or starter solenoid. After using this set-up for over 2 years, I am convinced it works. Lots of hot air can be felt around the front wheel wells when the Tiger idles. I doubt that the ports are effective at highway speeds due to the air turbulence created by the tires. Although the wheel well cooling ports are easy to do and don't change the stock appearance of the car (at least from the exterior), the approach is a bit messy and may not appeal to everybody.
The punch and rubber grommets may be obtained from the following:

PUNCH; MODEL 730 ROUND RADIO CHASSIS
Greenlee Tool Company
2136 12th Street
Rockford, IL 61101

Grommet Plugs; 1 3/4" diameter
AA Rubber and Plastics
2960 25th St.
San Francisco, CA 94110
415-826-3740

MODEL 963 RUBBER GROMMET PLUG
Atlantic India Rubber Company
571 West Polk St.
Chicago, IL 60607

Unknown Editors Note: Call/write for current price/availability information.

Improved Cooling for Snarled Tigers

by Phil Lindsay

Since my Tiger has to sit through commute-hour traffic snarls, I am always looking for ways to control overheating without resorting to obtrusive external modifications like hood louvers. The stock Tiger hood latch is set up with a "safety catch" which holds the hood after the striker bolt has released. It has always seemed that when the Tiger was in hot weather, it would run a little cooler with the hood "propped open" in the safety position. This is especially true at slow speeds when the hot air gets trapped in the engine compartment. I decided to attempt to improve on this "natural" Tiger cooling method. The additional cooling action occurs because hot air can escape out the small gap between the hood and the car body due to the safety catch. The size of the gap depends upon the dimensions of the safety catch mechanism and the stiffness of the spring which surrounds the hood striker bolt. I have extended the length of the safety catch hook by approximately 1/2". I fabricated the new hook from 1/16" mild steel and brazed it onto the existing hook. Since the new hook is slightly longer than the stock hook, I had to provide a cut-out next to the striker plate for clearance when the hood is fully closed. The coil spring on the hood striker provides the spring tension which holds the hood open in the safety catch setting. The stock spring is too weak to work with the modified safety catch, so it is necessary to install a stiffer replacement. Remove the old spring by unscrewing the striker bolt and visit the local hardware store. The new spring should be stiff enough to hold the hood open in the safety catch position and yet be able to compress when the hood is in the fully closed position. The final adjustment of the modified hood lock consists of adjusting the length of the striker bolt so that the hood remains firmly locked in the fully closed position. It is also important that the new, extended safety catch hook properly mates to its latch on the striker bolt assembly. Finally, it is important that the safety catch release when the hood control is operated. There is a fair amount of trial and error work in order to make it all work. With this set-up, my hood opens far enough that hot air can escape from both the sides and back edges of the hood. When the hood is fully closed, there is no gap and everything appears "stock."

"Powered by Ford" Badge Replacement

by Dan Cameron

For those of you in the final stages of restoration of your Tiger or just wanting to primp a little, replacing the "Powered By Ford" badges (motifs) adds a nice touch and is rather straightforward. The shield-shaped badges can be purchased from one of the SUNBEAM parts suppliers. It takes three to complete the car. To remove the old badges, carefully pry edges with a putty knife. The chrome plated badge framework has small projections at each top corner and one in the center on the bottom. As a precaution against scratching the paint, outline the badge with a couple layers of masking tape prior to badge removal. It has been my experience that for the most part the badge framework is in pretty good shape, however, the badge insert is bad. With the badge removed, the plastic 260-289 insert will lift out. New badges (motifs) are available in plastic like originals or ink stamped aluminum and much thinner than originals.

To hold the metal badges in place, purchase some epoxy ribbon from your local hardware or auto parts store. This will mix like two strips of clay and is mess free. Place a small ball of epoxy in all four corners and press flush with rear face of framework. Once cured, the badge is ready to snap back into place.

Chrome Side Molding Replacement

by Dan Cameron

Many paint shops would rather use masking tape than take the extra time to remove the chrome trim. But in doing so a lot is sacrificed in the quality of the job. Why not take it off yourself—it is easy and it will not be all buggered up when you get it off. Here is the procedure for removal. It is important to note that the chrome molding snaps over the heads of special pop rivets at approximately one-foot intervals with the following exception. The fastener on the furthest point forward on the front fender and the furthest point rearward on the rear quarter panel (fender) is a small special bolt with a nut holding it in place. To access these, you must remove the front wheel and reach up into the wheel well and remove the trunk side panel and reach up by the tail light assembly respectively. As luck would have it, three out of the four will break right off. But that is okay, we have got a fix. Lift the remainder of the molding off with a putty knife. While the car is being painted, go to your local bolt shop and purchase four small 1/8" or 3mm bolts approximately 3/8" long. Purchase eight flat washers and four lock washers as well. I went to an industrial fastener supply house and obtained stainless steel bolts for that added protection from rust. I took the chance and did not remove all the special pop rivets when I sent the car to the paint shop. My painter said he could work around them and did very well. However, there is some risk in doing this, so weigh your decision carefully. With the car back from the shop, I let the paint (lacquer) cure approximately 30 days, rubbed it out, and put a good coat of wax on it prior to reinstalling the side moldings. As a result of not removing the special pop rivets, I had to carefully scrape the paint residue from them in order to pop the molding back on. On the two pieces with the bolt on the ends, place a flat washer on the bolt and slide the bolt into the channel of the molding. Place the molding on the side (fender—front or rear) of the car, position and pop on the special pop rivets in a couple of positions. From the trunk or front fenderwell access, place the second flat washer, a lockwasher and a nut. Even though I tightened the nut rather well, the bolt itself did not turn. A final comment on the orientation of the door side moldings. Even though I carefully identified each end front and rear when it was removed, upon reinstallation something was not right. One end of the door molding is rounded while the opposite end is wedged down. I knew the molding had never been off the car, but it did not make sense that the wedge end would be marked "rear". A few phone calls confirmed my suspicions. The good old boys in England had it in reverse—too much fog! The wedge end does go toward the front and is essential for door swing clearance.

Trunk Panel Replacement

by Dan Cameron

After years of weathering, the fiberboard trunk panels begin to lookpretty bad. If you are getting ready to tackle this project, thesteps below should help:

1. First, you need to purchase the following items:
   - Hardboard: this is a waterproof cardboard used by auto upholstery and trim shops for making door panels. It comes in 3'x 4' sheets.
   - Aluminum pop rivets with washers.
   - Adjustable shelf metal strip approximately 4' long.
   - Contact cement.
   - Spray on upholstery adhesive.
   - Vinyl: 3'x4-1/2'
   - (26) screws and washers
2. Next, using your original panels as a template, cut out the newpanels using a packing knife. To get a nice, clean edge, I sanded mine with fine sandpaper.
3. Now, install the panels with the metal screws. This is only a temporary measure to assure fit and allow for drilling of screw holesin the hardboard.
4. After proper fit is assured and the panels removed, reinforce theside facing the gas tanks with a short piece of metal shelving strip.I think the strips I used were about 14" long. This step is onlynecessary to prevent warpage when the trunk compartment becomes hot. Position the metal strip approximately 3" down for the top (running from front to rear of the car) and secure with pop rivets and washers. To avoid having the pop rivets show through the vinyl, countersink the hole, install the rivet and cover with a short piece of duct tape. The exact position is determined by trial and error method so as to eliminate the possibility of interference.
5. Finally, cut the vinyl covering about 1" larger than the panelitself, spray the panel surface with the spray on adhesive, let it airdry (will not fully cure) for 3 minutes and place the vinyl overpanel. Turning the panel over, roll the edge of the vinyl over the backside and secure with contact cement (not spray adhesive). Locate mounting holes with a prick punch and you are ready for final installation.

On the Installation of a Convertible Top

by Dave Reina

For those of us in the club who own Rootes cars which are convertibles the time eventually comes when we need a new top. On one hand it hurts to part with the bundle of money that a new top installation costs, but on the other hand it's nice to think of how pretty our car will look with a neatly-tailored piece of attached vinyl (to say nothing about how nice it will be to see out the back window again.) Over the years that I've owned convertible Sunbeams I have always wondered if I could handle the installation job myself. Doing so could cut the total cost about 1/3 to 1/2 depending on which installation shop does the job. I finally got up the courage to try one. I must say that while this first job took me a long time everything came out fine in the end, and I was happy with the way the top fit and looked.

I would like to say that the job goes best on a nice hot, sunny day so the vinyl can be stretched as the work goes along. Second to this a very warm garage with perhaps a heat lamp or a couple of hot hair dryers. I would like to add that while this job is not impossible for us amateurs to handle at home, it does require patience and time enough to work unhurried. The first time I did the job it stretched out over a week, an hour or two at each session. About the only tool which one might not be able to find around the house is a good pop rivet gun. They are available in hardware stores, rental stores, or perhaps can be borrowed. The tool list is as follows:

- Phillips head screwdriver, medium tip
- Regular blade screwdriver, medium tip
- Two awls or ice picks
- Contact cement (1/2 pint of fresh, good quality cement)
- Brushes (Small 1" disposable brushes for application of the contact cement)
- Scissors
- X-acto or utility knife with fresh blade
- Pliers
- Pop rivet gun
- Aluminum rivets (1/8" diameter, grip range 1/8". About 15 or less required)
- Chalk, masking tape and a pencil

I would like to mention that there are three different types of tops on the Alpines and Tigers of the sixties. The early Alpines have extra metal bows that snap around the windows to keep a tight seal around the windows. The Series III, IV Alpines and MKI Tigers had what is called a cable top (there is a flexible steel cable that runs through the border of the top around the side windows and is tensioned by a spring hidden by a little metal cover on the top bows). If you are installing a top of this type, you will need new cables as this is not supplied with the tops. It is called 1/16" airplane cable but can be a little hard to find under that name. An easy source for this wire or cable is the bike store where it is sold as replacement cable for 10 speed bikes. When you get a new cable top there will be apiece of string through the channel in the top where the cable will go. Don't pull this string out!! The idea is to tape the new cable to the string and use the string to pull the cable through.

The other style top is the Velcro top which uses a strip of Velcro to keep the top fitted nicely around the side window. Other than the Velcro-cable difference the Series IV and the Series V tops are the same. Series IV tops have a thick cloth bead sewn into the back bottom sides which is caught by the metal top concealment covers and which helps keep this part of the top tight against the body. The first step is removing the old top in the back under the back window. Unscrew the sheet metal screws which go through the aluminum hold down strip. Also, remove the two shorter copper colored hold down strips. Then, remove the black vinyl hold down strips which are located where the back edge of the side windows meet the top. Now the top is attached only to the front bow. To remove it from the bow, carefully work the rubber weather stripping out of the groove on the bow. Under this rubber you will see a series of rivets which hold down this weather-strip track. This strip also secures the top material. This riveted strip is delicate so don't bend or pry it. Instead, use the drill in the hole which is in the center of each rivet. This drilling will cut off the top of each rivet. Sometimes the rivet will spin and not allow the drill to cut. In this case take a screwdriver and chisel the head of the rivet off. Now the top is off and you have seen where the points of attachment are. This is a good time to oil all the joints of the top frame and make sure it is adjusted correctly. Notice whether the front bow has an even gap across the length of the windshield when it is snapped up.

(There should be a gap which is later sealed by the rubber weather-strip.) If the gap is not even, adjust the length of the chromed hinged tensioner bars. Another point to check is directly behind the door where the frame is hinged and attached to the body. There is a cam action here which moves the frame in and out as the topis raised and lowered. This action is sometimes hampered by a rusted mechanism. It should be oiled and made to work. This is also the perfect time to touch up rusted areas on the frame and give everything a fresh coat of paint. It does take some time to do this task. Most rust paints take a full day to dry before they can be recoated with enamel. On my car I removed the rubber cockpit combing. A lot of dirt collects here. This strip can usually withstand being removed and cleaned with a little solvent. I found rust spots which had begun where the screws went in. Number 220 grit wet or dry sandpaper is good for cleaning up lightly rusted spots. For the final sanding of the frame tubes a 320 grit wet or dry does a good job of smoothing. I recommend oiling before painting, then wiping everything down with a cloth soaked with paint thinner. I've noticed people switching from the original gray to black painted frames. A part of the frame which might need replacing are the rubberized webbings riveted to the frame rails. They seem to serve the dual purpose of keeping the bows in alignment and preventing the top from fluttering too much. A non original but good looking replacement for these straps is black seat belt webbing. A more accurate replacement can be found in a furniture reupholstery shop where they still use the rubberized type. As with most jobs, fussy preparation work is 90% of the job. Once you have the frame into a condition where you will be happy after the top is installed we can talk about the actual installation.

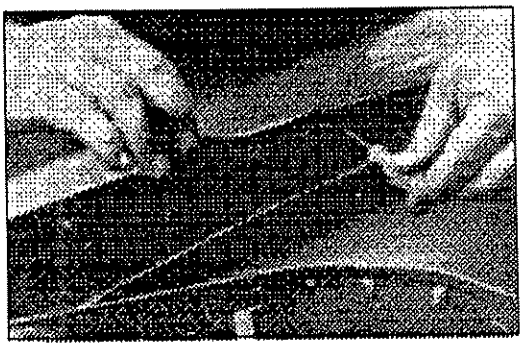


Photo 1

- Coat the cleaned rubber (vinyl actually) cockpit edging with contact cement. Coat the body where the edging goes with cement. Let the cement dry to the touch. Use an awl to locate the original holes and press into place.

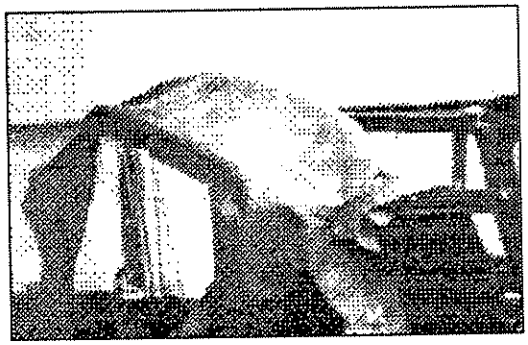


Photo 2

- Drape the top over the raised framework. Line up the top seams of the top with the bows underneath them.

- The first important alignment of the top material is the area where the top meets the rear edge of the door window openings. (See photo 3) If the top is too far down at this point the door windows would catch the material. If the top is up too much it will not seal and the metal bows will be visible. The bead of the rain gutter of the top should completely cover the metal bows beneath the material but should not extend past this point. This work can be done one side at a time. When you are happy with a side use masking tape or have an extra pair of hands hold things in place. Take the vinyl covered metal strip which came from the side you are working on (there is a right and a left side strip) and press it into place over the new material. Push an awl thru a screw hole and the material and find the old screw hole in the frame. Attach

it with a screw and continue with the other holes. When you do the opposite side you might have to do some stretching to get the top aligned as described above.- On the front edge of the top measure and mark the center with apiece of chalk. (See photo 4)

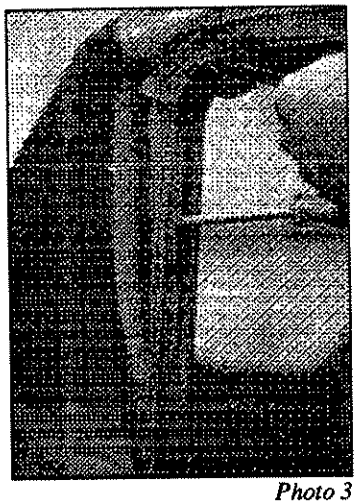


Photo 3

Do the same on the metal front bow with a pencil.- With an extra person helping, pull the top taut across the front bow. At this point it will start to look like you are getting somewhere. As the top is pulled across the bow rub chalk over the top material where the top bends around the front edge of the bow. (See the dotted line in photo 4) This reference point is important.- Fold the top back and slip some newspapers under the edge. Coat the underside of this edge with contact cement about as far back as the chalk line extends on the other side. Also coat the underside and inside lip of the metal bow where the metal weatherstrip holder had been riveted.

AN IMPORTANT WORD OF CAUTION AT THIS POINT! WHERE THE CHROME TENSIONING BARS HINGE IS A DANGER ZONE FOR YOUR NEW TOP...THERE IS A SCISSOR ACTION HERE AND IT WILL EAT A LITTLE HOLE IN YOUR NEW TOP! PAD THIS AREA WITH CLOTH WHEN YOU ARE WORKING AND EVEN AFTER YOU ARE FINISHED CHECK OUT A WAY TO KEEP IT PADDED.

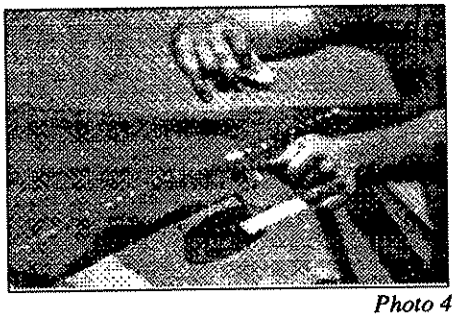


Photo 4

-Let the cement dry. Line up the center marks. Start from the center and using the line drawn in the previous step, start to attach the material to the bow. Instead of going exactly back to the line, stretch it about 1/8 of an inch past the line so the top will be little tighter. If you attach the cemented areas in a way you are not happy with, pull them apart, reglue, and take a coffee break as the glue dries again.- As you get to the two ends of the front bow the material will need to be notched to help it bend around the curve. (See photo 5) The notches will be about one inch apart and come in about five inches from the ends. Don't cut in any closer than a half an inch from the chalk marks. As you come around the curved ends of the bows where the notches are, pull the vinyl and stretch it so it lays smooth and tight on the top of the bow. The material will have to overlap itself through this notched area. Don't hesitate to pull things apart and reglue them for a better fit. Just be careful when pulling near the notched areas so that you don't start a rip. In fact, be careful pulling anywhere on the top with too much force. As you work snap the bow in place to see how it is stretching. It may seem a little tight at first. Certain wrinkles will be removed when the back is stretched.- When the front is done chalk center marks on the top from inside the car. Also do the body metal. Release all tension on the front of the top. Put a screw through the center hole of the back aluminum strip. Allow about 1/4 of an inch of material to extend past the bottom of the strip, center it to the chalk mark and screw it to the body loosely.- Work from the center out. Pull the material down with the pliers and use the awls to locate the old holes and install the screws loosely. After the strip is about two-thirds finished, working out from the center, stop and remove the center screws again and retension the material using the pliers. Make the hole for the new position and this time tighten the screws, again working out retensioning as you move out. NOTE: The top does not get screwed under the

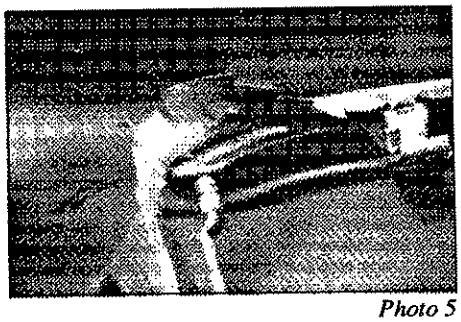


Photo 5

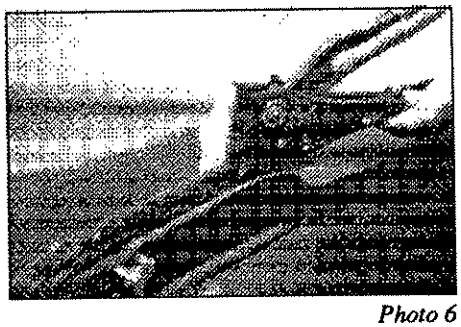


Photo 6

two small copper colored aluminum strips from the back cockpit.-Snap the top up, and go back and make adjustments for any wrinkles which remain.-Replace the front weatherstrip holder. Use the awl to find the holes and rivet into place. (See photo 6) When you are happy with the total fit trim the material. I hope your job comes out as nice as mine did.

Hardtop Rear Window Installation

by Curt Hoffman

For those of you installing a new rear window, particularly if you are installing a glass rear window, you may have wondered — do I put the rubber molding on the glass and then fit to the top or put the molding on the top and fit in the glass? The answer is to put the rubber on the glass first. A slick trick to then get the rubber all the way around the top is as follows:

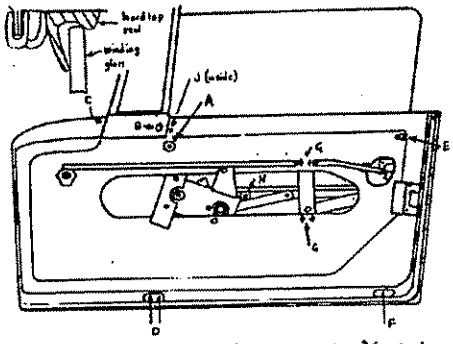
1. Install the rubber molding on the glass with the thick part to the inside. The flatter side goes to the outside and will accept the chrome trim as a last step.
2. Take a long loop of insulated 14 gauge multi-strand wire (it probably does not have to be exactly 14 gauge, but that is what I had and it was a good thickness to use), and slip it into the slit that the top flange will ultimately go into. The wire should be long enough so that it goes all the way around the glass. The two ends should meet and come out at the bottom of the glass with enough to spare so that you can grab onto each end.
3. Spray some silicone lubricant into the slit over the wire to make the wire slide easier and protect the rubber from tearing.
4. Place your hardtop on your living room rug, with the top up and the front edge down on the carpet. This allows you to crawl under the back edge on your back and look up through the rear hole soon to be filled with glass.
5. Have your next door neighbor pick up the glass — with rubber molding installed and wire in the slot — and place it in the hole as evenly as possible. The rubber molding will be sitting on top of the flange that will need to enter the slit currently being occupied by the wire.
6. Have your neighbor press down on the glass with enough force to be serious but not enough to break the glass and crush your face.
7. With the pressure coming down on the glass, you should begin to slowly pull the wires out of the slot. As you pull the wires out the rubber molding lip will be forced up and over the flange on the hardtop. Once you are all the way around the glass, the rubber will be completely seated on the flange.
8. Install the chrome trim on the outside and you are done.

I tried, initially, to use a small screwdriver to work the rubber over the flange. That way did not work at all. The above trick took only about 10 minutes total, and I had a completed window. With the proper cut Plexiglass it would probably be even easier. The Nova windshield I used had just enough difference in curvature that the last foot of wire pull was a little tough. The window seated suddenly, though, and poof! I was done. I used the same technique to get the rubber molding on the front of the hardtop which also would have been a little tricky without the wire.

Hardtop Doors - The Inside Story

The following tech tip came from the UK—through the Sunbeam Alpine Owners Club, written by Chris Barker.

The stylists' and customers' desires for frameless door windows on convertible cars present the automotive engineer with a number of problems and life is made more difficult when the winding window has to fit both a hardtop and a well-engineered soft-top frame. Fortunately, as with many aspects of its design, Rootes did a thorough job in designing the Alpine doors so that they can be set up to work well and to minimize draughts and wind noise. This article attempts to explain how to do this. Window winders are one of the Alpine's known weak points but I think that most failures result from overloading caused by maladjustment or lack of lubrication—are yours stiff to turn? It's worth mentioning that John Hayter of the Berkshire Sunbeam Alpine Center can supply reconditioned winders or kits of bits. Incidentally, the Rootes Alpine workshop manuals never mention these adjustments and the SV manual still has SI/II pictures and words for removing and replacing the winding window! There is a sketch which will, I hope, help you understand the words. I have drawn a SV (of course!) but SIII and IV are very similar and some of the adjustments also apply to SI and II.



Alpine SV R.H. door – window ¾ raised

Before touching the door's insides you should adjust the lock striker (on the rear wing front edge) and the hinge positions as necessary so that the door fits the body and closes easily. Unfortunately, there is no adjustment to compensate for worn hinges. The striker will lift the back of the door a little and shimming out the lower hinge might help but will push the door back as well as up. Drilling out and re-pinning the hinges is the only long term answer. Removal of the hinges usually requires an impact driver but sometimes a LARGE pozidriv screwdriver and Mole grips are enough. If you have a hardtop, fit it. If not, raise the hood. To get at the door innards you will, of course, have to remove the trim panel. Now, where do we start? The first job is to set the top of the glass parallel to the hardtop edge rubber seal. Slackening the four screws "G" allows the rear of the winder to be raised or lowered, thus tilting the glass. The next step is more tricky. First a bit of explanation, the quarter light locates on the lower front window channel but it is fixed by a screw "B" (don't lose the spacer behind the chrome if it's a GT) and by the upper and outer screws at "C". Remove these and you can pull the whole thing up and out but for adjustment just slacken them. The lower front channel is fixed by a screw "A" second screw "J" above and outboard of "A" inside the door on the other side of the channel and by two screws "D" at the bottom. To undo "J" you need a 5/16 AF open ended or flat ring spanner. Screws "D" and "F" need a 5/16 AF socket, box spanner or cranked ring spanner. If all else fails drill out "D" or "F" with a 5/32" drill and

replace with pozidriv-headed self tappers. If "J" is stuck you won't be able to remove the channel but adjustment should be possible. Slacking "A" and "J" allows the top of the lower channel to move fore/aft to locate with the quarter light. The main adjustment is at the bottom of the channel; loosening screws "D" allows it to be moved fore/aft and in and out, and the quarter light and channel tilt accordingly. The fore/aft is easy. Just set the channel so that the quarter light fits snugly against the screen pillar seal. A word of caution if you have hard and soft tops. My hood pulls the screen back a little so don't make it too tight with the steel roof. The in/out setting should be such that when winding up the window, with the door closed, the glass just, BUT only just goes outside the "flip" of the seal—see scrap view on the picture and Note 1 below. When all is well, tighten screws A,B,C,D, and J. O.K. so far? Good. Now slacken screws "E" and "F". This will allow the rear channel to move fore/aft at the top and both fore/aft and in-and-out at the bottom. Set it out so that the window winds easily and has about 1/8" fore/aft freedom. I have found that a silicone rubber lubricant spray helps the glass slide easily. The winder channel on the bottom of the glass should be greased. That's why I suggested setting up with the hardtop, but you might wish to make some comparisons. To finish, a few miscellaneous points which may be helpful and which I hope will make this the definitive article on Alpine doors:

1. The rear edge of the winding window can be moved out if necessary by putting a washer between the top of the channel and the door. The upper limit for winding the window is set by adjusting the stop in the winder channel (screw "H", accessible with the window about 2/3 up). The idea is that the glass should be as high as possible while just brushing over the outer ridge of the hardtop seal when the door is shut with the window up—see scrap view. That's just about it. If you have hard and soft tops, raise the hood and see how things fit. There is inevitably more noise with the hood, inner skin at screw "E". Don't overdo it or the winder will be overloaded by friction with the outer waist seal and your glass will get (more) scratched.

2. An almost perfect replica of the outer waist seal can be had from Paul Beck, Vintage Supplies, High Street, Stalham, Norwich, NR129BB. It's Part No. 771. This seal is about 1/2" too long and I suggest you cut the excess off the back. This means that many of the indentations for fixing clips match up. You have to cut the one for the front clip and extend a few others. This is easy with a Stanley knife. Similarly cut the seal around the quarter light rear pillar. Amongst alternative seals are that for theTalbot/Chrysler Sunbeam and I see that Alpine West Midlands offer one, Part No. RU5.

3. I am told that Lynch Bros. of Accrington still have clips for the outer waist seal (2212159). If you are desperate they are easily made from thin steel—dimensions on the sketch.

4. Austin Maxi (or 1800) door seals will fit Alpines. If your scrapyard has a recent car, get one front door seal. If there are only old cars I suggest you get two rear door seals (they last longer) and select the best lengths.

5. The Furflex trim under the edge of the aluminum tread plate is easy to find new but if you're at the breaker's looking for Maxis keep an eye open for a Golf. They seem to rust like Alpine tail pipes and this trim is used on all the doors.

6. If you have to weld new metal onto the bottom of your doors make sure that the oval access holes for screws "D" and "F" are not filled up! If in the process you lose the channel which holds the door seal it can be replaced with a piece of suitable bright trim—that off the side of a Herald or one of the cheaper Imps for example. Glue and pop rivet it in place wrong way around.

7. The screen pillar seal with the metal insert can be replaced by Landrover parts 395598/9. They are a bit bigger but O.K.

8. The winding glass rear channel filler can be replaced by felt strip 1-3/8" by 1/8". Length is 16". I am sure that new fillers can be found for the other channels which are 1/2" wide—does anyone have definite chapter and verse? (Rev. Llewrab perhaps)

9. Making new Tourer door trims is very easy—use 1/4" foam between the vinyl and the hardboard. Clips can come from a scrap Minx etc. or from Woolies, part no. 260 (Tel Market Deeping (0778) 347347). It's also quite possible to make new GT trims, complete with pattern—see my earlier article.

Windshield Wipers

by Tom Ehrhart

If you're like me, you sometimes get fed up with our two-speed (slow and slower) windshield wipers, especially when you encounter a deluge so extreme that you have to pull over and wait out the worst of the rain because your equipment just can't handle it. Well, short of trying to soup-up your wiper motor, there's a little goodie on the market that will enable you to cope with excessive moisture with ease. It's called RAIN-X, "the invisible windshield wiper." I mean to tell you, this stuff is amazing. It comes in a yellow 7-1/2 ounce bottle for around $5., but one bottle will last several years. It's some long-chain polymer that, when on auto glass, "forms a super slick rain repellent coating" that make rain bead for an aerodynamic run-off and amazing visibility. RAIN-X actually works, unlike too many cure-alls-from-a-can. You can literally drive in a downpour at night without wipers and still have full visibility. If you have trouble finding RAIN-X at the usual places, try checking at a truck stop. Thanks to Mr. Finespanner of the Austin-Healy Sports and Touring Club (AHSTC) from whom this tidbit is pirated.

Paint Color Codes

Factory Service Bulletin
TO: ALL ROOTES DEALERS MODEL: ALL MODELS SUBJECT: EXTERIOR PAINT COLOR CODE NUMBERS

Further to previous Service Bulletins which have been issued on this subject, we give below a complete list of paint colors together with their respective color code numbers:

Code #	Exterior Paint	Code #	Exterior Paint	Code #	Exterior Paint
1	Embassy Black	39	Carnival Red	77	Tartan Red
2	Astral Grey	40	Glen Green	78	Lock Blue
3	Ascot Grey	41	Ember Red	79	Glade Green
4	Dawn Mist	42	Apple Green	80	Carribean Blue
5	Seal Grey	43	Regency Beige	81	Horizen Grey
6	Oyster Grey	44	Ash Grey	82	Silver Grey Met.
7	Cloud White	45	Caramel	83	Sapphire Blue Met.
8	Foam White	46	Velvet Green	84	Libyan Sand
9	Metallic Grey	47	Biarritz Blue	85	Tartan Red
10	Grey Metallic	48	Silver Grey	86	Forest Green
11	Thistle Grey	49	Cloud Rose	87	Goodwood Green Met.
12	Light Gun	50	Blue Haze	88	Airway Blue
13	Charcoal	51	Slate Blue	89	Burnt Almond Met.
14	Pebble Grey	52	Lake Blue	90	Silver Moss Met.
15	Fathom Grey	53	Wedgewood Blue	91	Lavender Grey Met.
16	Pearl Grey	54	April Yellow	92	Arctic White
17	Ocean Blue	55	Venetian Red	93	Storm Grey
18	Glacier Blue	56	Steel Grey Met.	94	Slate Blue
19	Moonstone	57	Azure Blue	95	Kingfisher Blue
20	Fiesta Red	58	Midnight Blue	96	Alabaster
21	Cornith Blue	59	Toledo Red	97	Royal Blue Met.
22	Airline Blue	60	Deep Bronze Green	98	Riverside Red
23	Windsor Blue	61	Quartz Blue Met.	99	Maroon Metallic
24	Blue Metallic	62	Bronze Metallic	100	Mediterranean Blue
25	Powder Blue	63	Solent Blue Met.	101	Not Used
26	Pippin Red	64	Summer Yellow	102	Oxford Blue
27	Burgandy	65	Not Used	103	Port Dixon Green
28	Calypso Red	66	Birch Grey	104	Willow Green
29	Morocco Brown	67	Light Green Met.	105	Bermuda Blue
30	Seacrest Green	68	Autumn Gold Met.	106	Commodore Blue
31	Cypruss Green	69	Mid Green	107	Holly Green
32	Iceburg Green	70	Maroon	108	Polar White
33	Sage Green	71	Mid Bronze Green	109	Orchid Green
34	Smoke Green	72	Sky Blue	110	Capri Blue
35	Antelope	73	Not Used	111	Coffee Brown
36	Calvery Beige	74	Not Used	112	Yellow Gold
37	Wickham Blue	75	Glen Almond Green	113	Glade Green Met.
38	Royal Blue	76	Balmoral Grey	114	Sherwood Green Met.

Rejuvenating Battered Cylinder Heads

HEATER DEFROSTER

Many Alpine and Tiger owners have expressed concern over inefficient heater-defrosters. This problem is not so much one of design but of attention to details. Please note that none of the heater cores, except Tigers from #38200001 (Mark IA), are sealed in any way to the body at the blower air-intake aperture. Although this seal is shown for Tiger Mark IA on, it is often found to be missing. To obtain maximum efficiency from your system, the following items should be checked and adjusted, repaired or replaced as necessary:

1. Heater cores that have been subjected to radiator sealers, Stop Leak, Barrs Leak, and others generally become partially blocked across the bottom tubes. Flush or replace as needed.

2. Check the water control valve actuating cable. Be sure that the valve is opening fully. Adjust as necessary. See illustration.

3. Install cold weather (winter) thermostat. Minimum 185 F.

4. Seal the heater core to the blower air-intake aperture if your vehicle is not so fitted. Any medium dense foam or rubber strips or cut sheet (weather strip or typewriter pad) will work very well. The jute padding strip between the heater core cover and heater core side tanks must be left in place to prevent the holding stays on the under side of the cover from wearing a hole in the top of the core side tanks.

5. Inspect defroster hoses for tight fit (taped on) and freedom from kinks or crushed spots that would restrict flow.

6. Inspect all firewall plugs and seals. Where these are missing, duct (racer) tape works well if the proper plugs are not available. Also, a small strip of body sealer will help if the steering column seal is loose.

7. Inspect convertible (hood) top/hard-top to door glass for proper fit (seal). Adjust or replace as necessary.

8. Check the heater blower motor current draw. It should be less than ten amps.

Once having completed the preceding check list, the heating system will be operating at its maximum efficiency.

As an added note, all Alpines and Tigers prior to series V Alpine and Mark IA Tiger have small vents between the crash pad and the dash face at the extreme outer edges. These should be sealed during cold weather. In addition, remove blower motor and inspect the inlet screen. Leaves and pine needles often collect there and block the air flow.

Radiator Hoses

from CAT

Most of those numbers we have published for Tiger radiator hoses are good, but there is one number that is not. Do not, reapeat, do not order Dayco No. 71016 for use as a lower hose. It's too small in diameter.

Numbers for hoses that do work are as follows:

Upper	70627	Dayco
	71015	Dayco
	CH666	Dayco
0 'flow tank	70531	Dayco
Lower	21034	Gates

All will require some cutting to fit and, as you can see, the upper is an easy match.

Engine Mounts

by Ray McCrary (CAT)

Those TRW engine mounts listed in the Shop Notes manual are superior to stock Ford mounts. TRW includes an interlocking piece so that if the rubber in the mount fails, the pieces catch and the engine does not fall through. The Ford mount is straight rubber, and if it rips, that's it. The TRW numbers are 82220 for the left and 82221 for the right. Replace in pairs.

Ford Part Number Update

by Ron Fraser

Ford part number update:

Item	Old No.	New No.
PVC valve rubber grommet	378766S	C8SZ-6A892-A
Heater Hose fitting, (for intake manifold)		C6AZ-18599-B
Clutch lever dust boot	C3AZ-7513-A	C60Z-7513-C
Clutch lever anti-rattle spring	AB-7562-A	C6AZ-7562-A

PCV Valve Assemble

Both the Parts List and the Shop Manual for Tigers show the PCV valve as a right angle assembly, part numbers: C3TZ-6A666-A for valve and 378754 for adapter, these are no longer available. You might be able to find one of these assemblies in a junk yard or you could make one. The adapter could be made from a brass elbow or machined from square metal stock.

I found a similar threaded PCV valve Part No. AC Type CV-643C, it also had a Ford Part No. C4ZE-6A666-A. Alternate PCV valves are AMPCO PCV-484 which is very similar, and AMPCO PCV-58 which is taller.

On the 1969 Alpine GT Air Cleaner

If you look on the bottom half of your air cleaner housing, you will find that it specifies the correct air filter. You should be able to come up with a readily available unit that fits by using a good filter cross-reference book or by using this handy reference table.

DUAL CARBURETOR - 1725

Can Use:	I.D.	O.D.	H.
FRAM	CA2631	4"	5-3/4" X 2-3/8"
CROSSLAND	890	4"	5-3/4" x 2-3/8"

SINGLE CARBURETOR - 1725

Can Use	I.D.	O.D.	H.
AC	A2435	3-1/2"	5-1/2"x 2-3/8"
GUD	AG435	3-7/16"	5-1/2" x 2-1/4"
	AGl26	3-1/2"	5-1/2" x 2-3/8"
	TJB-8	3-1/2"	5-5/8"x 2-3/8"
PUROLATOR	AFP-563-1/2"		5.9x 2.6

(last resort) as well as ones covered under dual carburetors, but not vice versa.

Tiger Hose Replacement Found

by Scott Woerth

THE most stock looking radiator hoses I have found are Dayco part #666 (upper) and #679 (lower). Figs. 1 and 2 show the hoses positioned as you would see them when looking at the engine from the front.

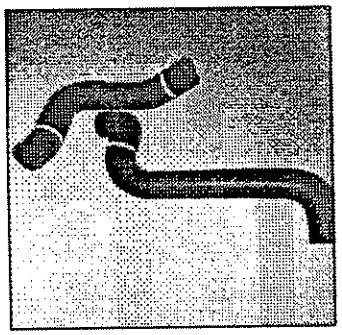


Figure 1

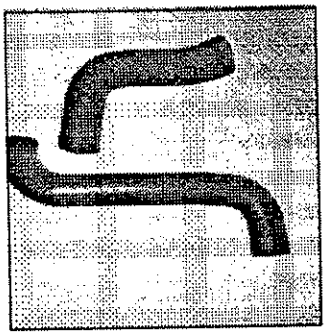


Figure 2

Cut the upper hose (the bottom one in the photo) as marked by the tape and mount this end on the thermostat housing.

The lower hose gets two inches cut off each end, and the end with the slight bend is mounted on the water pump.

Alpine Thermostat

You can use any Chevy small block thermostat for an Alpine. They are cheaper, easier to find and usually have a better flow than the stock Alpine unit. Install a 160 degree F unit in summer, and a 180 degree F unit in winter if you desire more heat.

Super Fan

by Phil Lindsay

In my experience, the stock Tiger cooling system provides adequate cooling of reasonably stock engines under most driving conditions. Notable exceptions are freeway snarls and slow hill climbing on hot days (especially when behind a Winnebago). Obviously, both of these exceptions occur when the air flow through the radiator is primarily due to the fan, since the "Ram"air flow is minimal due to the low car speed. The stock Tiger was equipped with a conventional shallow-pitch 4 bladed metal fan.

Much has been written on the advantages of replacing the stock fan with a high performance fiberglass unit. One fiberglass fan which has been used is the MODEL 214 Green-Bladed Fan made by Flex-A-Lite Corporation, Tacoma, Washington. This fan moves almost twice as much as the stock fan at idle, engine speeds and 70% more at cruising speeds (3000 RPM). Flex-A-lite has developed a stainless steel-bladed fan with even higher capacity than the fiberglas-bladed fan. Compared to the fiberglass fan, the new stainless steel fan, MODEL 1314, flows 25% more air at idle and 20% more at 3000 RPM. Since everyone knows that "you don't get something for nothing, it's worth pointing out the disadvantages of this "Super Fan. "Other than requiring slightly more engine power, the only problem is proper clearance between the front of the fan and the radiator, as well as the back of the fan and the upper radiator hose. If you have a stock radiator (2" thickness), there really is no problem because the fan can be spaced away from the water hub with flat washers to clear the hose. In this case, the fan hub hole (7/8" diameter) pump does not have to be enlarged to 1" diameter since the washers will space the fan away from the water pump hub. Those with "Fat Core" (2-3/4" thickness) aren't so lucky! In order for proper clearance between the back of the radiator and front of the fan, it is necessary to carefully ream out the 7/8" fan hub hole to 1" so it will fit over the water pump hub. With the fan located against the water pump hub, be sure there is sufficient clearance with the upper radiator hose, especially if the vacuum advance distributor mechanism is in the way. The Gates MODEL 20686 upper radiator hose can be cut so that there is clearance. Once properly installed, the MODEL 1314 Fan has provided a significant improvement in cooling for a number of "Hot Tigers."

Six-Blade Metal Fan

by Kent Williams (CAT)

Ford makes a 6-bladed metal fan which is the same diameter as the stock 4-bladed unit. That fan is P N C9DZ-8600-A. The bolt pattern and hole size is corrrect, but the center hole must be drilled out to 1" diameter.

Before installing, spin the fan to see that it clears the rack housing. I had to remove a small amout from each blade by grinding. Check balance carefully. I have used this blade for several years and have had no overheating at idle or low speeds here in the Texas heat.

Front Wheel Bearings

If you need front wheel bearings for your Tiger or Alpine and your local parts store doesn't have a listing, get the bearings listed for 71-74 Capri. The Sunbeam grease seal is no the same. The following are BCA numbers for Tigers and ALpines.

Inner 1988-1022
Outer (LM11949, LM11910) Seal 1090

Gas Shocks for Tigers

Does anyone make a gas-filed shock for the rear end of my Tiger?
Yes, but they will not admit it. One club member called KYB for one of their Gas-a-just shocks, they said they do not make a shock for Tigers. Order shock #KG5536 for a Capri.

Shock Absorber Interchange

What shock will fit on the Tiger (as compared to other cars)?
Your best bet is to buy a set of Konis or Spax for the Tiger from one of the Sunbeam parts houses. Although expensive, you can be sure they are going to bolt right on. The Gabriel "Adjustable E" models are also a good choice (model 63329 or 63170 for the front and model 63331 or 63171 for the rear). If you want to try a less expensive solution, some cross reference info is presented here. I can't vouch for the accuracy of these but they should be a good starting point.

Front	**Rear**
Sears # 79281	Ford Truck '50-'74
Full size Buick '65-'70	Lincoln '52-'54
Buick Riviera '66-'70	Corvette '60-'62
Cadillac '65-'76	Olds Vista Cruiser '63

With some of these shocks, it will be necessary to use different mounting bushings and/or bolts than supplied.

Breather to Air Cleaner Hose

by Jim Morrison

Having replaced the stock valve cover breather cap with an after-market chromed one, the search was on for a hose to connect the breather cap to the air cleaner. The stock breather cap has a right angle bend in the vent tube coming from the cap but the after-market cap (a Ford part) had a straight tube. A perfect hose was found in Gates part #21309. It is the correct diameter and length requiring no trimming for a perfect fit.

Carpet Clips

by Tom Ehrhart

Original blind carpet clips that are hidden in the carpet are available through Honda dealers. Ask for P/N 52302 for the fastener and P/N 52273 for clip. The male stud which secures the carpet to the floor is available from SUNBEAM parts supplier or a local sundry fastener supply house.

Brakes

by Burtis S. Horner

Since the preservation of our Alpines and Tigers depends upon many things, the least of which is ingenuity, and the most of which is time sprinkled with money, I thought a list of my "finds" may help someone else. For those who need parts, I can offer the following, and all of which I presently have in my 1965 Love, #B9470406 LR X FE. Brakes: Volvo piston #667592 from a 144-S fit the calipers. I'm told the 144-S calipers are the same as the original equipment. Rear wheel cylinders: Volvo #64674597. This is for the left and right. Servo Rebuild Kit: #SP2228 Girling - includes all gaskets and seals. The only problem is the large vacuum piston plate seal has to be re-cut to fit the bolt holes. Clutch Master Cylinder: Girling #3112250 W This is an integral unit. Steering Universal Joints: Jaguar #K05-6B1. These come pre-greased, and have a grease fitting included. Hoses: 90 degree Shaped hose from a Volvo 122-S 3898 Beck Arnley-Britannia for the radiator to overflow tank. Brake Master Cylinder: 5/8 Girling: The same as a Formula Ford, although mine is non-integral. Girling #625 from the Formula Ford racing dealer.

Can I use Capri Wheels on My Sunbeam?

Yes, both Capri and Capri II wheels can be used on a Sunbeam. The stock Sunbeam wheels are 4-1/2" x 13" with a 4-1/4" bolt circle and use a 7/16" RH lug nut; the Capri wheels are 5J x 13 with the same bolt circle and lug suze. Capri II's use a metric lug. They are visually identical to the late Alpine GT's styled steel wheels. Although a spacer of about 1/4" thickness must be used to clear the drum brakes, they will bolt onto the front spindle. When these wheels are shod with 185/70-13's, they may rub on the inner lip of the front wheel well.

Question: Steel Wheel Interchange

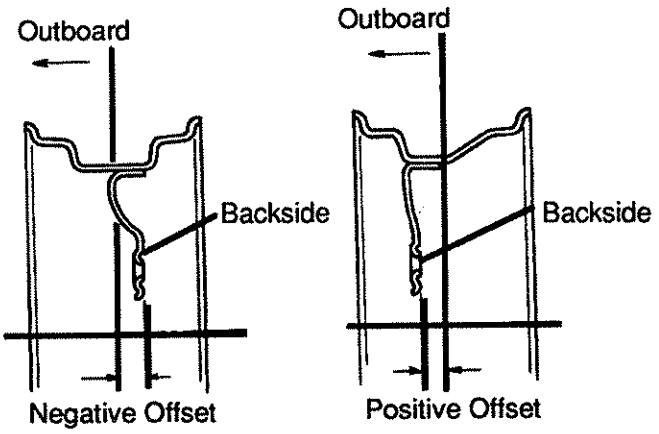
Question: What other car wheels fit a Tiger or Alpine?

Answer: The stock Tiger came with 13" rims that were 4.5" wide with a 4x4.25" bolt circle. A number of cars have wheels with this same bolt circle:

Ford Fairmont	78-86	Mustang (exc. SVO)	74-86
Thunderbird	80-86	Pinto	71-80
Fiesta	78-85	Escort	80-86
Mercury Mercur	85-86	Zepher, Z-7	78-86
Cougar, XR7	80-86	Mercur XR4TI	82-86
Lynx, LN7	82-86	Topaz	82-86
Capri, Capri II	71-86		

Of course, bolt circle is not the only criterion. Some of these arenot 13" wheels (although some 14" and the Mustang TRX wheels have been used on some Sunbeams). A major consideration is the wheel's offset. The Tiger requires a relative large positive offset. This means that the centerline of the rim (bead-to-bead

center) is inboard of the mounting plane of the wheel. Too much positive offset (as in wheels designed for front wheel drive cars) will cause rubbing of the tire on suspension components. Too little positive or, even worse, negative offset, will move the wheel too far outboard causing the tire to rub on the fender. A lot of the wheels that are on Tigers today are no longer made (eg. LAT-9, LAT-70 and American Racing Libre). Panasport wheels make six inch wide wheels for the front and seven inch wide for the rear with the correct offsets to help even out the front and rear tracks. The most common inexpensive solution is a set of Capri or Pinto wheels. They are 0.5" wider than stock with appropriate offsets. You may need a spacer on the rear for the wheels to clear the brake drums. One caution, stamped steel wheels designed for compact cars have been known to fail under hard use and we don't recommend these be used for hard driving conditions. Also, some wheels were designed for stud sizes larger than the 1/2"-20 used on the Alpine and Tiger. When using these wheels you must be sure to use a lug nut that properly contacts its tapered seat. If a lug nut is too small there is a high risk that the wheel will be dislodged.



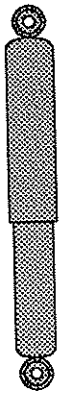
Preparation of Production Sunbeam Tiger Solo II/Pro Solo

by Barry Schonberger with Bob Jardine and Tom Patton

In 1975 STOA reprinted an article by L.C. (Bud) Bohrer, the 1974 SCCA Solo II "B" Prepared National Champion on "How to Autocross a Prepared Tiger." To this day, that article (see attached) remains an excellent reference for preparing a Tiger. In the 14 years since that article was published, SCCA Solo II rules have changed considerably (they even let us run tube frame cars), so a few comments are in order. My reference points for this article are two MK-1A's and an MK-11 that have won consecutive Divisional Championships in competitive SCCA Divisions and one SCCA National Championship. Preparing a car is like climbing Mt. Everest; the goal is to get to the top, but there can be a wide variety of successful paths taken to get there.

Suspension

Start here before you invest big dollars in your engine. All of the power that money can buy won't get you around the course unless you can get the power to the ground and make the car handle. Starting with the front end, don't hesitate for a minute to reinforce and rebuild the cross member as to the specs in Tom Hall's and Tom Ehrhart's tech tips. The stress that the front of the car will take when you bolt on race rubber is well beyond the original design. Pay special attention to the welds around the shock tower and A-arm bushing sleeves. Check the threaded plates where the lower A-arm attaches. Don't hesitate to tack weld the upper ball joints in place. Also, you must reinforce the sway bar clamp bracket slot in the lower arm. (Tom Patton failed to defend a Divisional Championship one year because of this failure). A strip of metal welded across the top will do the job. All inner A-arm bushings should be replaced with a solid material impregnated with a lubricant. The solid bushings give the driver a much better feel for the road and eliminate the suspension settings changing as a result of the rubber bushing flexing. The upper A-arms may be lowered at the shock tower to obtain an improved roll center and improved camber gain. A 1" solid or preferably hollow front sway bar set in solid bushings seems to do the job. I would recommend Koni shocks on the front set full hard. (Because of the front wheel spring rate on a Tiger, the springs need all the help they can get a spring rate of 250 lbs. and custom 70/30 shocks would be optimum.)



Concerning front springs, I found the CAT replacement springs acceptable when used with the rubber seats. I have known people to run them without the rubber seats to lower the car. A hard-to-get item, but one that makes a world of difference, is a quick-steer rack and pinion as offered by Bill Miller in the 70's. This unit reduces the lock to lock from 3.2 to 2.6 turns, providing a real asset in Solo. (This rack is no longer produced). Front end alignment was 1.5° negative camber, 3.5° castor and 1/16" toe-out. Toe-out helped the car turn in faster.

Current Solo II rules allow 12", 13", or 14" x 10" wheels or 14", 15", 16" x 8" wheels. The only two wheel sizes that are even up for consideration are 13" x 10" or 15" x 8". The reason for that is the availability of race tires from the major manufacturers. The current situation is not good. The 13" tires are still being developed, but not for

cars in the Tiger's weight class. Only two companies have 15" tires available with a third possible in the future. However, limited development is taking place in this area. The big advantage of the 15" wheel is the possibility of running bigger brakes. If you choose that route, however, you will be considered a GT spec car, rather than production, and may have to run the 10% weight penalty (not a good idea with a production car). The best answer seems to be a 13" tire, 9" to 10.0" tread face by 20" or 21" tire circumference. This tire is available from a number of manufacturers. When considering wheel offset, remember the stock front suspension geometry will only accept a 3.5" back space before the rim hits the rack and pinion arm. Most applications are only 8" rims in the front because of this clearance problem. With a 10" front wheel the offset is to the outside, causing scrub problems because of the design of the spindle and Akerman angles. (Look for new rules allowing 16" X 10" wheels in 1992.)

The rear suspension can take on a number of different configurations. I found that the forward spring mount needed to be reinforced. It's very common for this area to be rusted and cracked. I used the CAT springs in their hardest arrangement. Bob Jardine uses stock springs with additional clamps on the front half of the spring to prevent spring windup. I tried a number of different approaches to traction bars before I discarded all of them and went to Ford Mustang quad shocks. Talk about eliminating wheel hop and being able to launch a car, these babies do the job! Brackets were fabricated for the inside of the frame rails and the axle tubes. Credit for this application goes to Bill Miller, who was familiar with the use of shocks as a torque reaction device on the Hollywood car. The rear axle was raised in the chassis using 1" blocks at the spring pads. Blocks could be eliminated by de-arching the rear springs. This, in relationship to the front ride height made the car just a hair higher in back. Under acceleration, the suspension would even out. A new panhard rod running from driver's side to passenger side was fabricated to allow for rear roll center adjustment. A 3.73 LSD with the MKII wide ratio transmission allowed for the car to be driven in only 2nd gear on most courses. Shocks were Sprax Adjustable, set on three clicks or in Bob's and Tom's case, Koni's set full soft. The softer setting allows the power to get to the ground. I didn't install a rear sway bar. The car only pushed in tight off camber turns and I would compensate by braking deeper in those corners and getting the rear end to come around. Both Bob and Tom used a 5/8" rear bar. Stock springs and a bar just might have the same roll stiffness as the CAT springs. Bob likes the stock springs with a 5/8" bar, because it "gives me a little more compliance on the rear with rough surfaces." I ran a disc brake conversion on the rear, and Bob ran the LAT disc option, but we're not confident that it helped in the Solo application. My rear wheels were 13" x 10" with a 4" back space. The car did have Gremlin metal flares on all four corners.

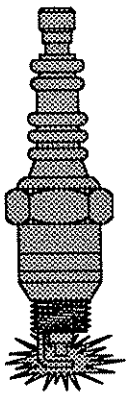
Brakes

Use a soft street Datsun Z-car pad. No metallic or semi-metallic, because they don't heat up fast enough. Datsun pads give you a little extra pad area. Braided brake lines with an adjustable brake bias in the rear line were installed. Bob kept his brake booster, because "It is a lot easier to modulate the brakes if you don't have to stand on the pedal!!" Bob also suggests "looking at Datsun for rear wheel cylinders that are direct replacements for the Sunbeam, but of different diameters."

Engine

With the new rules, you can run a 302 bored out .047" over with any head. This appears to be the hot ticket in the Tiger vs. small block Corvette game. A number

of Tiger owners have installed SVO aluminum heads with success. Other full comp heads could be a problem when it comes to headers. For Solo purposes, you want your torque range to be very broad, i.e. low duration, high lift and possibly a split profile. Unless you use a roller cam, it is difficult to get this profile. Big dollar item, but could make the car very drivable in one gear. As a starting point, I found the General Kinetics Co. "Redline" hydraulic cam with 290 Duration 438 lift strong (this area needs more discussion). Because of the RPM range involved and the torque needed, the Edelbrock Torker II with a 600CFM double pumper, was used, and time was spent tuning the carb (see reference book at end of article). A good electronic distributor with a computer ignition will do wonders in Solo because of the ability to keep the plugs from fouling. If you want to save a little weight on the front of the car, use an early timing cover with the exposed impeller aluminum water pump. A bigger radiator core is a must, along with an electric fan up front and 6 blade behind. An electric water pump drive comes in handy also to cool things down between runs. You are very limited when it comes to headers. The lack of space is your problem. A set of headers from CAT or J.C. Whitney will do the job.



Don't go too radical with your compression ratio if you intend to drive on the street. Ratios in the 10 to 1 range give you the power without excessive heat and octane problems. Compression does help torque however. Oil control in corners is a problem with the small block Ford. For Solo purposes, a Boss pan and windage tray will solve most problems. However, the investment in an Accusump system is recommended. For Solo, you might have your engine builder set the engine up with pretty wide main and rod clearances. You don't get much of a chance to warm the oil, and the clearance helps. Bob recommends a good oil cooler to help in cooling.

Engine and Transmission Mounts

Drill an extra hole and add a 5/16" bolt to the driver side mount. Weld up a solid mount on the passenger side. Bob says wheel hop can be controlled by enlarging the plate on the tubular transmission mount. This restricts the movement of the rubber mount.

Rear End

The Dana 44 rear end is plenty tough for Solo. The Power Lock LSD is as tough as they get with its four spider gears. You might consider shimming up the LSD so that the release pressure is higher. Use a gear lube additive to control clutch chatter.

Clutch

Quick acceleration and engine braking are important elements to a successful Solo car. For Solo II, a double or triple disk racing clutch is essential. With its lightweight (18-21 lbs.) and small diameter (7-9 inches), the racing clutch will make a significant difference. McCleod makes one of the best, followed by RAM and Quarter Master. The down side of this clutch is its in/out characteristic. There is very little feel. Starts can be a problem, it is not streetable and for a ProSolo launch, you lose the weight of the flywheel. Use a soft diaphragm spring if available with not too high a ratio.

You might also consider an internal throwout bearing slave cylinder. Manufactured by Tilton, Quarter Master and others, this item has proven to do the trick. Alignment and spacing are critical in the setup. Certain models only work with certain clutches

because of clutch finger design.

Fuel Supply
A good Carter, Holley, etc. fuel pump with a constant 56 lb. pressure is what you need. Install a good, large-capacity fuel filter because the Tiger fuel tanks will peel their lining. If you're in a hot climate, consider a cool-can to chill your fuel. It can be located where the brake servo once lived. The stock metal fuel lines are acceptable.

For additional information, don't hesitate to contact me.
Barry Schonberger
(812) 985-9592

Winter Storage Tips

by Robert J. Jaarsma

Depending on your personal circumstances, you might each store your Sunbeam during the winter months in a different fashion. However, what is the proper way to do this? We will have all one thing in common, to do this in such a manner, that the next spring your treasured vehicle is as good as when you put it away. A plan of attack with a yearly check-off list will help so as not to overlook any details.

1. To guard against frost, the ANTIFREEZE should be of a 50/50 mixture, to prevent the coolant from freezing. If not sure, test with an inexpensive coolant tester. Do not risk disaster!
2. Fill your tank with GASOLINE, this will reduce the amount of moisture which can be absorbed in the gasoline and slows the rate at which the gasoline turns to varnish. The addition of a can of "dry-gas" will be a good idea.
3. Give your engine an OIL CHANGE before storage. This reduces the etching caused by the acidic old oil.
4. Fill the CLUTCH and BRAKE cylinder reservoirs to the MAX level. This will reduce the moisture absorption.
5. Always put your SOFT CONVERTIBLE TOP up, as this will avoid nasty creases in the fabric and window.
6. Take your Sunbeam for a nice CRUISE to let all the moisture in the engine and exhaust system evaporate.
7. REMOVE THE BATTERY, since a depleted battery can freeze up and crack. Place the battery in a frost free area. Preferably recharge it once in a while during the storage period.
8. SPRAY a can of WD-40 or a similar oil over the engine parts, and other bare metal components to avoid corrosion.
9. Do not put the car on the PARKING BRAKE, as the brake shoes can freeze up.
10. Close off the EXHAUST PIPE(S) with duct tape, to avoid moisture build up inside.
11. Cover the AIR FILTER with plastic and duct tape, to keep moisture out of the carburetor.
12. Make sure interior and trunk are absolutely DRY, raise carpets to inspect.

13. All doors, windows, vents, hood and trunk should be CLOSED, to keep rodents from entering.
14. Cover your "baby", but never with plastic.

Considerations about the storage place itself:
1. If there is a cold concrete floor, put plastic over it, before you drive your car in place.
2. Daily traffic around your stored prize possession? Consider the possibility of accidents resulting in that unwanted scratch or dent.
3. If storage is outside, make sure snow cannot trap moisture underneath the car. Make sure ample air circulation is guaranteed at all times.

Long term storage considerations (12 months or longer) :
1. All the above, except:
2. Drain all filters, bowls and tanks of gasoline.
3. Add several squirts of oil into each engine cylinder. Crank engine, rotate internal components.
4. Elevate the car, using jack stands on the outer ends of the front A-frames and the U-bolts of the rear leaf springs. In this way the suspension will not drop away from the body and unduly strain the shocks.
5. Back off the brake shoe adjustment to avoid the chance that the shoes will rust to the drums.
6. Every couple of months move the clutch and brake pedals, and rotate the wheels.

The Doctor's Corner

by Raymond Lynch, D.M.D

The mystery has been solved! Doctors Randall and Smith, take note.

Before sticking my hands into a Tiger's mouth, I liberally apply Protec by DuPont, a white cream available at auto-supply and plumbing supply stores. I push some extra cream under the fingernails and give it time to dry before beginning.

Secondly, buy a box of "examination gloves" from a dental or medical supply house which you can find listed in the yellow pages. These gloves are extremely thin, and will not affect your tactile sensitivity. Further, after five or ten minutes, the fingertips will tear away from your thumb and forefinger. Keep the torn gloves on. When you've finished working, you will usually have only three or four dirty fingertips instead of two filthy hands. The Protec makes the cleanup of these very easy.

One more tip: An ultrasonic cleaner will do a fantastic job of rejuvenating your front and rear turn signal lenses, and license plate light lenses. Ten minutes in my ultrasonic made mine sparkle like new. Ultrasonic cleaners are used by every dentist, jeweler, and many opticians. Pack up your lenses, and go remind your dentist how much your last crown cost!. Any Tiger/Alpine people in my area are invited to drop in and use mine.

Fasteners

None of the fasteners on my Sunbeam are marked with the Society of Automotive Engineers (S.A.E.) markings as described in the August 1984 Newsletter. When replacing O.E.M. bolts with new S.A.E. grade ones, how do I determine which grade to use where?

To answer the question, the British use a different system to grade their fasteners known as the British Unified Series or B.U.S. The sizes and the number of threads per inch are the same, but the grading system is different. The common grades used are Auto R, Auto S and Auto T. See Figure 1 for head identification marks.

Although the B.U.S. system is not directly transferable to the S.A.E. grading system, the table below (Fig. 1) should help you pick out the correct fastener for your application.

B.U.S. GRADE	S.A.E. REPLACEMENT
AUTO R Very low grade bolt used to hold on such things as your horns or body pieces.	**Use S.A.E. Grade 5** Stronger than auto R, but cadmium plated for corrosion resistance and quite inexpensive.
AUTO S Hardened bolt	**Use S.A.E. Grade 5** Can be used for Auto S except for critical fastening areas such as the driveline or steering. Not quite as strong as Auto S.
Auto T Alloy bolt, used in very high stress areas such as clutch pressure plate to flywheel.	**Use S.A.E. Grade 8 or 9** S.A.E. grade is slightly stronger than Auto T. Grade 9 bolts feature higher heads and very high corrosion resistance due to alloy content

The S.A.E. system only goes up to Grade 8. Bolts above this strength are generally known by the manufacturer's own designation such as "FEDALLOY" or "PARCOLLOY". They are marked with 12 slashes on the head or "F9" typically. They offer several advantages; I personally use them almost exclusively even for very low stress applications.

1. A higher "crown" or head makes them much more resistant to rounding off by your wrenches.

2. Higher grade bolts are much more corrosion resistant. A grade 2 bolt has no corrosion protection, a grade 5 or higher bolt is zinc or cadmium plated and the grade 8 or 9 superbolts are manufactured with an alloy content.

3. High grade bolts are stronger. Ham fisted backyard mechanics (most Sunbeam personnel) will have trouble breaking them and, of course, they have an extra safety margin of strength for all applications.

One warning though. Always use nuts and washers of the same grade as the bolt. This can not be over-emphasized. Recently a club member attached the flexplate of his automatic Series IV Alpine with the correct high grade bolts but used low grade washers. As the bolts were torqued, the washers deformed unknown to the owner. After a short distance, they all loosened and several fell right off. Luckily the problem was diagnosed in time and no damage resulted.

CAT Grade 8 Bolts

Barry Schonberger passed along the following tip to TE/AE members:

In the process of updating and improving our beloved Tigers for competitive use, we should all employ Grade 8 lock nuts and bolts at high stress areas. During this process, you may be faced with the problems of high cost, the request to purchase in large quantities only, and a limited stock of sizes.

A quick and easy solution to this dilemma is to visit your friendly local CATERPILLAR dealer. Everything CAT lists is at least Grade 8. Their standard bolt has a proof load of 120,000 PSI and a tensile strength of 150,000 PSI. Their high strength standard bolts have a 140,000 PSI proof load and a 170,000 PSI tensile strength. The nuts and lock nuts share the same specifications. Their prices are very reasonable and the selection is wide. Their stock covers both coarse and fine threads, and a variety of self-locking bolts also is available. Most dealers are able to supply overnight delivery on out-of-stock items.

And, for the Tiger owner who really likes detail, these bolts have class—each has the word CAT forged right into the head!

Coming Up From the Bottem; or, the Best Laid Plans

by Curt Hoffman

I was involved in a discussion in the newsletter some time ago on which was the best way to install a Tiger engine; from the bottom or the top (I supported coming up from the bottom). I based this opinion on the difficulty I had removing the engine through the top. To test the bottom theory and the fit of my spanking new headers, I practiced installing the engine with headers installed from the bottom. I was able to bolt up the engine in around 30 minutes from the time I hooked up the winch to the body. Obviously, there could be no doubt as to the ease of this method. Now, a year later (I never said I was quick or rich), I had a rebuilt engine—the headers coated—and was ready to install the engine for the final time. I invited a few friends over with the assurance that this would be a 30 minute job again and they could then go about their business. Four hours, a case of beer and several new volumes of disgusting descriptions of the potential heritage of the Tiger originators later, I finally had the engine bolted in. What caused this turn for the worse ? The transmission. In all my practices I never had the transmission attached. As I have now pieced the sad story together, my problem looks to be the backup light switch attached to the linkage. I have a MkII and the switch sticks back from the linkage about 1.5". This switch hits the frame of the tunnel and prevents the engine/transmission assembly from going

far enough back to allow the headers to clear the crook in the frame without undoing them. Obviously, when I only installed the engine, I did not have this problem. I don't know if the MkI has the same switch or not since I don't recall seeing the same backup lights on all Tigers. Without that switch, I am fairly certain nothing else would have prevented me from backing up the engine another inch. And that was all I needed. There is no way to remove that switch (that I can find) without removing the engine (entirely) or the linkage. I'm not sure which is harder although the linkage looks impossible while in the car. Needless to say, I had to undo the headers. It wasn't as hard to bolt back up as I thought mainly because the brake and clutch master cylinders were not yet in place. Still, it defeated one of the good reasons I thought the bottom up method was superior. Perhaps it still is. Another interesting quirk I ran into; with the weight of the engine now on the frame, the bolts coming up through the cross member would not line up by approximately 1/16". I had to lift on the engine to take the weight off and keep the frame from spreading that small amount. Any misalignment will cause the cross member bolts to not go. Again, very frustrating. In any case, it is all bolted in; and I hope to still meet my original goal of having the car ready for the United. After two years on the blocks, I am almost ready to commit to what year the United will be in as well (1987?!?).

(Newsletter editor's note: not too long after we received Curt's hard earned Tech experience, a follow up ending to the tale was forwarded)

P.S. The switch on the MkII transmission that prevented me from pushing the engine as far back as I like turned out to not be as hard to remove as I thought. Once I got the car up on jacks (approx. two weeks after I sent the last note because of my sour state of mind), I was able to see it could be easily removed. As I was rummaging through the literature I received with some of the many parts I installed in my newly installed engine, I noticed a warning from Hays. Basically, it said to be sure (in no uncertain terms) to remove the spacers in the new pressure plate from between the lever arm and the cover prior to installing the pressure plate. It is a terrible thing to not only cry over your Tiger but also to want to murder an inanimate object like a car. I was sorely tempted to let the spacers remain in their current location deep within the bowels of the Tiger. My neighbor assured me, however. that ten years from now (or when my pressure plate blew up) I would be sorry for not taking care of the problem now. So, in spite of my feelings, last weekend out came the engine again. This time I removed the switch on the transmission. Having done that, I was able to remove the front crossmember, brake lines, engine and transmission; remove the stupid little spacers staring me in the face from the pressure plate; and reinstall the engine again in the space of about 2-1/2 hours. I am now back to where I was before I wrote the original note. This time, though, I did not have to remove the header on the driver's side saving me at least an inch of skin on my knuckles. Particularly since I had the brake and clutch master cylinders in place by the time the second go around came.

Problem Solvers

FRONT END POINTERS
author unknown

a. **VIBRATIONS**
   1. Tires balanced?
   2. Wheel bearings may need grease or adjustment.
   3. Too much play in rack and pinion. If you hear a dunk (a what??) from the steering while going over bumps, chances are the rack is bad.
   4. Disc brake rotor warped

b. **HARD STEERING POINTERS** (Tiger)
   1. Oil filter is rubbing against U-joints?
   2. Rack and pinion dry. If so squirt 90 wt. gear oil through the end of rubber boot on rack.
   3. Steering U-joints bad
   4. Rack may need rebuilding

For those who don't know, your steering column is telescopic!

ODORS INSIDE CAR

a. **GAS**
   1. Check tanks and connecting hose for leaks
   2. Do not fill tanks completely full
   3. Check vent line for blockage

b. **ENGINE FUMES**
   1. Exhaust leak
   2. Lost rubber grommets on firewall. There should be no holes.
   3. Trunk lid not closed tightly or bad weather stripping on lid
   4. Holes in floor
   5. Excessive grease buildup on drive train
   6. Hood not closed tightly. Fumes will enter through vents.

The Literary Sunbeam

by David Lawler

Oh, yes...what could be more relaxing than curling up with a good book, and what kind of book could be better than a Sunbeam book? Here is a review of the more popular reference standards.
These books have become reference standards because of the volumes of information researched and documented by the authors. Information provided should be used as a reference, not as fact unless specifically certified by the by author. Remember, mere mention of details by the author does not make it fact.
These books, when in print, are available from one of the marques spares vendors.

The Making of a Sports Car by Mike Taylor
In this book, Mike Taylor tells the full Tiger story—the prototypes, the complex development programme, the full production history and the car's competition career in Europe and the United States. Produced between June 1964 and July 1967, the Tiger was aimed primarily at the American high performance sports car market, where success was still largely determined by the maxim "win on Sunday, sell on Monday." But, despite high quality engineering by Rootes, who did the development, and by Jensen at West Bromwich, who did the testing and put the car into production, the Tiger always seemed to be beset by unfavorable circumstances. It was launched very much in the wake of Carroll Shelby's AC Cobra, a car that posed formidable opposition. And its production coincided with a rapid deterioration in Rootes' financial position, which ultimately resulted in the takeover by the Chrysler Corp. in 1967. As Mike Taylor shows, it was this rather than any shortcomings in performance that was responsible for the Tiger's early demise. Mike Taylor has combined a wealth of technical detail, drawing on many of the original Experimental Road Test Reports, with a comprehensive yet often humorous narrative. The result is a very readable Tiger tale.

Although primarily written for the Tiger enthusiast, Tiger, Making Of A Sports Car has information relevant to Alpines too; a somewhat expanded second edition was released in 1991.

The Classic Sunbeam by Chris McGovern
This is the first book to give the full story behind the Sunbeam Alpine, one of the most successful British sports cars of the 1960s. It is also an excellent documentation of ROOTES years leading up to production of the Tiger. It was ahead of its rivals in both design and standard of manufacture, the Alpine was the brainchild of designer Kenneth Howe and the Rootes Group management. Chris McGovern has produced the first book to give a complete account of the Alpine, from its initial design to the end of production in 1968. He describes the early prototypes, the marque's development from Series I to V, the various "hybrid" models and the competition history—both road and track. This book is considered one of the best references for Alpine and Tiger heritage.

Air Conditioning in Your Tiger

by Bob Yurasits

First of all, if your car runs hot (200+) don't even bother installing air conditioning. To make my car run cool, I installed a 4 tube 2 3/8" thick radiator (top hose bent up slightly); full fan shroud; kept the overflow tank; installed a 14" stainless steel flex fan (hard pitch); and blocked off horn holes. Also, I installed a 260 water pump (more vanes; the water moves faster at idle and absorbs less heat). Room is very tight as we know in the Tiger, so everything that is done must be to the bare minimum. No sloppy workmanship here. The radiator must be placed as far forward as possible. This is done by straightening the lip on the radiator opening and moving any excess material which will interfere with the radiator. Remember to place the radiator as far forward as possible because the rack must be moved forward 1/8" by using a spacer on the mounting surface of the rack. I used a 260 water pump on my 289. My car ran hot at idle, not at driving. Pullies used are PN 3905989 Chevy 6 cyl. water pump; 2 grooves redrilled for Ford. Possibly, research could produce a

V8 pulley which would bolt right on. The lower pulley is stock Ford pulley machined and welded to match the Tiger pulley. The pulley's clearance is about 1/8" to 3/16" from the rack. The air pump (compressor) is a Sanyo 505 which is 6 7/8" long, with the charge fitting on top of the pump. The air pump is placed on the left side of the block in place of the oil filter. Use a remote oil filter under the fender which gets it out of the engine compartment. The air pump brackets must be made. To do this take the air pump and place a long rod through the pump mount holes and thread it into the left head where the oil filter bolts. Now proceed to make brackets. Mine consists of a spacer at the rear of the pump and a triangular one at the front of the pump. It goes from the pump to two bolt holes on the water pump. The adjusting bracket is a shortened Chevy generator bracket which also goes from the water pump. The condenser is from a Celica, or anything small enough to be placed in the radiator opening. I chose an aluminum condenser because it is less dense when looking through it. The condenser is placed in front of the radiator like in conventional cars. Brackets are made to go from condenser to existing radiator lugs which are not being used. Now for the dryer (receiver). I used one from a Plymouth Duster. It is very small, about 5" tall. I placed this behind the stock water bottle on the right fender. Here again, another bracket must be made for mounting. The evaporator used is also from an old 65 Plymouth (under-dash type). Mount this under the dash (hood latch handle must be relocated). I relocated mine alongside of the evaporator. Hoses run from the evaporator (both together) out of the car's firewall under the brake servo and then over the right inner fender. One runs to the dryer, from the dryer to the condenser, and from the condenser to the pump (compressor). The other goes around the front of the condenser, out of the horn hole, to the pump. After the pump is hooked up and all hoses are attached, a fan spacer must be made. I used a stock Ford spacer and cut it down to size. Make sure your fan clears all objects, hoses, etc. Now that your fan is only 5/8" away from your radiator, you need a full fan shroud which can be made out of fiberglass. Remember to keep your fan 1/3" in and 2/3" out of the shroud with 1" gap on the diameter. Naturally, every Tiger is different, so brackets may vary and so will dimensions. But, the theory is here. My car runs very cool, around 180 to 185 degrees. It goes up slightly with the air on (190 to 195). I also installed a 160 degree thermostat. I hope this will be of some help for you Tiger owners who would like to install air conditioning in your Tiger.

A Radar Detector Mount

by S. Finberg

Recently it became desirable to mount a radar detector in my Alpine. The only reasonable place was on top of the dash pad. Drilling any holes was out of the question. I was afraid to use the manufacturer's suggested-self stick velcro on the delicate dash pad, and besides, it would not stick once the dash was Armor-alled. As a solution, I constructed a bracket which slides over and latches around the curved portion of the dash pad. A hole catches on one of the tonneau cover snap posts to lock it in place. An additional hole is provided to latch over the other tonneau snap post if you want to drive with half the tonneau up. The surfaces which touch the vinyl dash are padded with felt. My detector (an Escort) looks out through one of the wiper blades when mounted as shown. Fortunately, the blades were long ago changed to plastic to prevent windshield scratches. Plastic blades won't block the microwaves as metal might. Dash pads seem to vary from car to car, so you

should measure your own. I constructed my bracket from .05" thick 5052 aluminum. The curved section was formed by hand bending around a slotted piece of 1 7/8" o.d. iron pipe, after making the first lip. The entire bracket is painted with Krylon ultra flat black. Felt is then secured with contact cement to all surfaces that touch vinyl. The front holes were measured and drilled after the rest of the bracket was complete to make a tight "snap" fit. When securing the radar detector to the bracket, be sure that no rivets/bolts go through any area which would touch the vinyl. For the Escort, this involved adding an extra rivet hole in its plastic bracket midway, between the two existing ones. This bracket provides a secure radar detector mount without defacing the dash pad. In addition, it is quickly and easily removed, leaving no trace of the radar detector for snooping eyes.

Performance Bar Availability

PERFORMANCE AND MILEAGE

The Sunbeam Tiger is a child of the muscle car era or the middle 60's, when Sunoco 280 was 35 cents a gallon. Times have changed, octane is down and gas prices have doubled. We find ourselves in the gas miser era. How does the Tiger rate for performance and gas mileage — GRRREAT!!!

EXTRACT FROM ROOTES EXPERIMENTAL REPORT DATED 18TH FEBRUARY, 1966

Performance figures obtained from Tiger II '289', test weight 3,023 lbs. Vehicle tested had 8.8 to 1 compression ratio, not 9.3 to 1. Comparitive figures obtained for Tiger I are shown below.

	Tiger II	Tiger I
Acceleration in Top Gear		
20-40 mph	5.4 sec	5.8 sec
30-50 mph	5.2 sec	5.8 sec
40-60 mph	5.0 sec	5.8 sec
50-70 mph	5.4 sec	6.2 sec
60-80 mph	6.2 sec	7.2 sec
70-90 mph	6.8 sec	8.8 sec
80-100 mph	8.4 sec	?
Accereration Through Gears		
0-30 mph	3.0 sec	3.6 sec
0-40 mph	4.2 sec	5.0 sec
0-50 mph	6.3 sec	7.0 sec
0-60 mph	7.9 sec	9.2 sec
0-70 mph	11.0 sec	12.3 sec
0-80 mph	14.0 sec	15.3 sec
0-90 mph	17.8 sec	21.7 sec
0-100 mph	22.7 sec	?

Mean 1/4 mile times	122-125 mph	117-120 mph
Average consuption on Edge Hill course at average speed of 26 mph	21-24 mpg	18-23 mpg
Fuel Consumption At Constant Speeds		
30 mph	31.1 mpg	33.8 mpg
40 mph	31.2 mpg	33.1 mpg
50 mph	29.9 mpg	29.6 mpg
60 mph	26.9 mpg	27.2 mpg
70 mph	23.5 mpg	24.0 mpg
80 mph	20.9 mpg	21.7 mpg
90 mph	18.2 mpg	19.6 mpg
100 mph	15.6 mpg	?

Roll Bar Availability

Question: Does anyone make a roll bar for the Tiger?

Answer: Sunbeam Spares of Lenexa KS, sells a roll bar for the Alpine and Tiger. J.C. Whitney also sells one for Sunbeams. The CAT Club sells a SCCA construction style roll bar. Sunbeam Specialties sells a "show bar" which can be SCCA approved. Others may be available from other sources. NOTE: Metal convertible top storage compartment covers may not fully open when a roll bar is installed. (Ed. note: Check availability and current prices, allow for $50 to $100 for shipping because bars must be shipped motor freight.)

Refinishing Plastic Pieces

by Jim Morrison

The black plastic pieces making up the steering column cowling, the steering wheel hub and the telescoping adjustment section are usually quite faded and discolored on a car that has spent its life with the top down (especially in the southern sun). These were brought back to a jet black, glossy finish that looks great and seems to be quite durable. Each of the pieces was scrubbed with soap and water to remove the loose dirt, oxidation and general crud. Then, on the particularly bad pieces, a light wet sanding with 600 grit sandpaper was performed to get down to the bare plastic. The pieces were then coated with a spray can of clear gloss polyurethane coating. The results look great with a deep black, high gloss finish really adding the finishing touch to the interior restoration.

Restoration

by Peter Long

I have the engine, the seats, trim, dashboard and wiring harness out and have scraped off the bituminous impregnated paper from the floor. I am removing the clutch and brake hydraulics and it looks as if I shall have to take out at least part of the steering linkage to be able to refinish the paint in the engine compartment, where the hydraulic fluid has spilled. My question is: How far to go before starting to build up again? What do I take off under the car to get to the 'frameup' starting point? Is there any good step-by-step book for restoring an Alpine? Tech Editor response: Briefly stated, I recommend that you take everything out of the engine compartment and from under the car, so that you may do a complete job of refinishing and repainting. The extra work in going that extra step is worth it in the end. I am unaware of any book specifically written for the restoration ofAlpines and Tigers.